



Issue 20, Autumn/Winter 2020

Abstract Games

...for the competitive thinker

Schada: A vintage mindsport

Spiral: A solitaire connection game

Fenix: The best of Chess and Checkers

Blooms: A brilliant revisioning of Hexagonal Go

Schnapsen: The minimalist point-trick game for two

Murus Gallicus: A Roman successor to Greek Epaminondas

Front Cover

Pagode (or Pagoda) was published by F. X. Schmid in 1973. The image shows a detail from an ongoing game with the original F. X. Schmid set. The full-board position is shown on Page 1, opposite. The game box cites “Valentin Siena” as the author and states, in my translation of the original German, “A board game derived from ‘Shuti,’ an ancient game of astrology from East Asia. It is richer in problems than Chess, but simpler in its rules.” Actually, the designer’s name is a pseudonym for Friedrich Johann Gebhardt (1919 - 2006), there is no East Asian game called “Schuti,” and in fact no traditional game anywhere that is anything like Pagode. And of course, the game Pagode has nothing to do with astrology.

Despite these uncertain origins, Pagode was well liked when it appeared. Rod Rivers reviewed Pagoda in Issue 46 of *Games & Puzzles* magazine (March, 1976), giving it the highest score of 6, a rare accolade for *Games & Puzzles*. In Issue 50 of *Games & Puzzles*, Kendall Johns suggested a modification of the scoring system, and then in Issue 66 Rod Rivers followed up his review with some thoughts on opening play. The rules of Pagode were covered in the book *Das Buch der 555 Spiele* by Erhard Gorys (Naumann & Göbel, 2002), and play was illustrated with an annotated sample game. Actually, two annotated sample games are included in the original rule book, making a total of three historical annotated games. Pagode enthusiast Derek Carver submitted a description of Pagode for *AG13*, and then some clarifications of board colours and first turn rules were included in a letter from Ralf Gering in *AG15*. (Some of the other historical information here is also thanks to Ralf.) Nevertheless, Pagode remains an obscure old game—sadly, because it is very good.

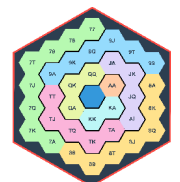
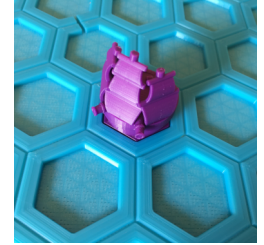
Pagode is an alignment game played on a 9x9 board with three different colours, one colour for each player and a neutral colour. Each player has seven pieces each of two different types, Stones and Columns. The Columns are easier to relocate on the board, but they do not score. A Stone on its own colour scores double; a Stone on the opponent’s colour scores a single value; a Stone on the neutral colour does not score. The players place their pieces on the board in an attempt to form “buildings.” Most buildings are squares of different sizes, the larger the square, the greater the base scoring value of each of the Stones that constitutes the building. Two pairs of pieces of the same colour facing each other across opposite sides of the board also score highly. The most valuable building is a “Pagode,” which is a square with all four pieces on the central row and central column. A building scores the total of the values of the pieces constituting it. A building consisting only of Columns is “illegal.” Two other kinds of illegal building are a line of three pieces equally spaced or a line of four pieces where spacing is irrelevant. An opponent can “tear down” an illegal building and remove its pieces from the board.

A player who creates a scoring building can declare the end of the game. The opponent then makes one last move. The winner after the opponent’s last move is the player with the higher-valued building. Obviously, you do not declare if you see that your opponent can beat your score with one more move! Only the winner scores, the total value of the winning building. A match consists of a series of games—not unreasonably, since games tend to be quick.

Pagode is an unusual scoring alignment game. Like many (most?) alignment games it tends to be tactical rather than strategic, although there are obvious and simple strategies, like placing Stones on your own colour. A key technique is to force your opponent to defend against your creation of a building by making an illegal building. Then, you tear down the illegal building, establishing a material advantage. As with most (all?) alignment games, the main technique is to create multiple simultaneous threats. Pagode is a largely forgotten game, which deserves some attention. ~KH

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OUTSIDE BACK COVER
Spiral





We started the new series of *Abstract Games* a little over one year ago and came close to meeting the old schedule of four issues in a year. Much of the content in these first four issues has been concerned with catching up on good games published in the last 17 years, since the original series of *Abstract Games*.

The astute reader will note that we tend only to cover games that we think are really good, which is the case even for the game reviews. We select only the best games to review! We do not want to write reviews to warn people away from games, and the best we can do is share our enthusiasm.

Inevitably, some of these games are so good that we are still playing them regularly. Games that we have continued to play that have been covered in the few issues include Tak (*AG17*), Keil (*AG18*), and 3D XYZ Chess (*AG19*). Of course, there are others that need more attention, including Push Fight (*AG18*, *AG19*) and Carnac (*AG19*). The current issue covers two other games that we have played a lot over the last several months, NXS and Fenix. Also, Murus Gallicus and Blooms in the current issue are certainly worth investigating in some depth.

In the editorial of *AG19*, I spoke of the volume of new abstract games being developed, and the difficulty of giving each of the many excellent new games the proper attention that it deserves. I think the conclusion here is simple mathematics. With so many more new games coming to the attention of players, while the pool of

players does not increase commensurately, there must necessarily be a higher turnover of games actually played. As time goes on, players devote a shorter and shorter attention span to new games. Of course, there are exceptions, and the high-turnover argument concerns only abstract games and their players in the aggregate. Nevertheless, the emergence of new abstract games faster than we can assimilate them is an interesting feature of the world of abstract games that is certainly more noticeable than 17 years ago. Of course, an advantage of the large number of new abstract games emerging is that among them a few must be really, really good, and these are the games we try to target in *Abstract Games*.

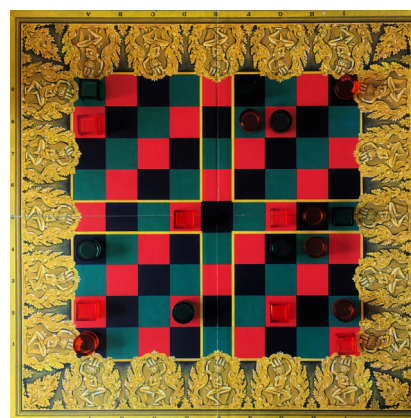
David Ploog's interview of Stephen Tavener about Ai Ai and related matters, from page 4 in this issue, is very interesting in respect of the large number of abstract games emerging and how to decide which ones are worth playing. Stephen discusses using Ai Ai to decide on the number of "skill level" a game has, which presumably is an indication of the depth of a game and the difficulty of mastering it. The number of skill levels in a game is perhaps one of many potential metrics that can objectively evaluate the extent to which a game satisfies certain desirable qualities. Of course, this approach can evaluate variants of new designs to help make decisions about the "best" variant. Indeed, from page 11 in this issue, Pablo Schulman follows this approach with Tix and its variants, using Ai Ai to estimate the first player advantage (along with a number of other metrics). A desirable quality of two-player abstract games is that both players have roughly equal chances to win, and Pablo's research suggests a minor alteration in the rules of Tix itself to accomplish this goal.

Over the months we have thought carefully about whether or not to revive the game design contests that were an important feature of the original series of *Abstract Games*. We have decided not to go ahead with this for now. The situation in the world of abstract games is quite different to

what it was at the start of the current century. At that time, *Abstract Games* had little competition, whereas now the BoardGameGeek and other sites give developers plenty of other options for presenting their games to the public, including a number of existing game design contests. *Abstract Games* still has a unique niche, but the design contests seem to be adequately dealt with elsewhere. We can always adjust and initiate the contests again if there is substantial interest from the readers.

In the meantime, stay safe and happy gaming!

Kerry



Puzzle solutions from page 10.

Symple

1. i8, 2. a4, i1, d4, h8, 3. a5, f8, h6, i9, 4. f7, a2, h1, 5. a9, i6, 6. b6 Black wins 19-18.

Lines of Action

1. e3-d2, 2. e4-c2, 3. d2-c1, 4. e1xb4, 5. a5-a4, 6. c2-b2, 7. c1-d2, 8. c8-d7 (no move defends), 9. d2xb2.

Knight Line

1. i8-g9(2), 2. e9-f7(1), 3. h10, j11(2), 4. h7-i9(1), 5. h9-j10(3), 6. i11-j9(1), 7. j8-i10(1), 8. f6-h5(1), 9. j8-k10(1).

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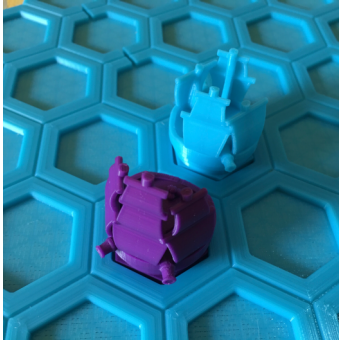
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NXS

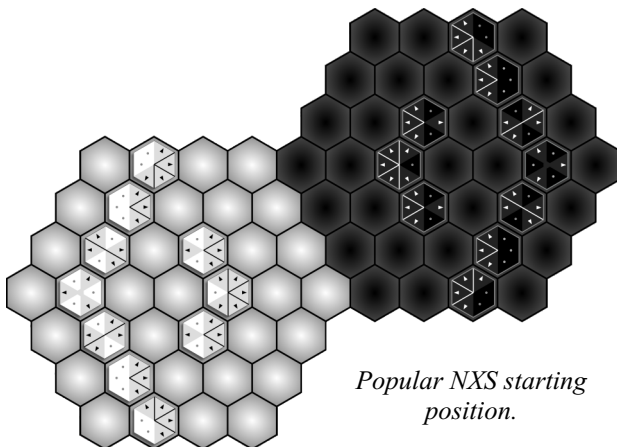
Man-o-War

by Kerry Handscomb

The game NXS (pronounced “Nexus”) is game for two (or three) people played on two (or three) modular base-4 hex-hex boards. I have only played the game with two, and the review will focus on the two-player version. However, the author, Kevin Kane, assures me that the usual problem with three-player games, where two players can easily gang up and eliminate the third, is not much of an issue with NXS. This feature of NXS, that it is a good game for three, is worth investigating on its own.

In any case, two players use one modular board each, which are pushed together, and their pieces are arranged in predetermined patterns on their respective home boards. Each player uses 7, 10, or 13 pieces. Various aspects of the game are customizable, including number of pieces. Other options are to use one or two Merchants per side (explained below) or to change the number of points required to win. Different choices require different strategies. The options available are one of the nice features of NXS.

NXS is playable on Boardgamearena, where the most popular version is 10 pieces, 1 Merchant, and 10 points required to win. My personal favourite version is 7 pieces, 1 Merchant, and 9 points to win; which leads to a shorter, sharper game emphasizing speed. See below the starting position in the most popular version.



Popular NXS starting position.

The pieces each have three sets of markings: directions they can move, in straight lines through hexes connected at their sides; the number of spaces they can move; and lastly, the directions they can capture, one space “diagonally.” Note that the sum of the number of directions a piece can move and the number of spaces it can move always totals six. Capture is by replacement, so that a piece jumps one space diagonally to the hex of the captured piece, which is removed from the board. Crucially, these captures cannot be made if either of the two hexes flanking the diagonal are occupied by an enemy piece.

It is interesting that pieces capture in a manner quite differently from the way they move. In addition, the capturing rule

is asymmetrical, depending on whether either player has a piece on one of the spaces flanking the diagonal. With one of your own pieces as a “flanker,” you can capture, but your opponent does not have a reciprocal threat. These very common positions have the feel of “shooting over the shoulder” of the flanking piece.

The pieces are all named after varieties of old-time sailing ships, such as Cutter, Frigate, Corvette, and so on. This is somewhat of a theme, although NXS is truly an abstract. The play of NXS reminded me of a space-combat wargame I was working on many years ago, and I can imagine various other themes, too. One special piece, the Merchant can neither capture nor be captured. Some setup options have two Merchants on a side, and some have one.

Each turn a player must move or make a capture, and then rotate a piece to change its directional orientation. Reorienting a piece is mandatory, and it does not have to be the piece just moved. The necessity to rotate a piece each turn is an interesting design choice, but a good one, I think. Often it seems as though there is no significant rotation, and you might just as well pass—if you could. However, now and then I find myself regretting a missed opportunity to rotate a particular piece a move or two or three earlier. Missing fewer of these opportunities is a sign of good play, I suspect.

To my mind, its objective is what makes NXS special. The goal is to capture territory on the opposite board. Territory is counted for each friendly piece on the enemy board—one point per piece. However, if a piece has an uninterrupted line of sight back to the home board, an extra point is scored for each of the empty hexes along the way. Likewise, if two friendly ships on an enemy board have an uninterrupted line of sight between them, an extra point is scored for each of the empty hexes along this line of sight. Players can play up to 8 to 13 points, decided at the start of the game, and as soon as the winning total is reached, the game ends immediately.

As the game starts, the pieces of both sides rush to their joint border, over which the struggle ensues. This aspect of the game reminded me most of a hard-fought rugby scrum. The pieces have to work together. As I mentioned above, when threatening an enemy piece, with a flanking friendly piece, you can attack with impunity, as the enemy piece does not threaten you back. The Merchants are important here, because they are immune to attack, but can provide cover for your own attackers. With two Merchants on each side, the border can get congested, making progress more difficult.

As pieces are exchanged, the border becomes more permeable, and pieces start slipping through into enemy territory. This is where the game really shines. Often, at the end, both sides can construct winning positions, but one player is just a move or two ahead. The game becomes a race to reach a winning position. When I realized this property of NXS, I was immediately reminded of Shogi. Of course, Shogi is a kind of chess, and the ultimate objective is to capture the enemy King—which is nothing like the goal of NXS. However, the drop rule in Shogi makes it a superb attacking game that accelerates as pieces get exchanged. In a balanced game, both players will have unstoppable mating attacks, often with only one or two moves separating them. Shogi has an intense, exciting endgame; whereas Go, for example, tends to peter out towards the end, as individual moves become less and less significant. NXS has an intense and exciting endgame, just like Shogi. To my mind, the effect of their objectives to speed games to a climax is an excellent feature of both Shogi and NXS.

Of course, individual Go games may have exciting life and death struggles in the endgame, and it is certainly not my

intention to disparage Go. But nevertheless, the trajectory of games such as Shogi and NXS is inexorably towards all-or-nothing climactic moves at the end, which is not true of Go. I think it is interesting to review David Ploog's article on "Stories and Themes in Boardgames" in *AG18*, from the perspective that Shogi and NXS more effectively support certain kinds of narrative than Go. On the other hand, Go much more effectively supports other kinds of narrative, and players can choose their preferences.

My preference is the game with fewer pieces and a single Merchant, which highlights the effect of the objective. The "rugby scrum" phase is shorter and less significant, and the game speeds to an exciting conclusion. Of course, other players might actually prefer the puzzle-like nature of the more congested board—and as I mentioned above, one of the strengths of NXS is its ability to accommodate various styles of play.

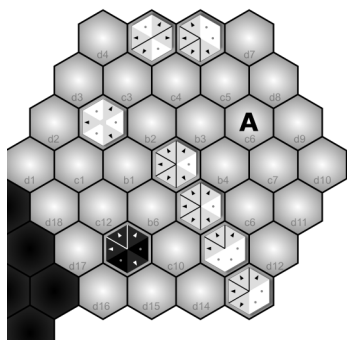
The physical board is made of sturdy plastic with ship-like models for the pieces. It is a very nice set. Of course, you can try the game on Boardgamearena to see whether you like it. NXS has a lot going for it, and I highly recommend it.

Please refer to the NXS website for further information and to purchase a set. ■

Puzzles

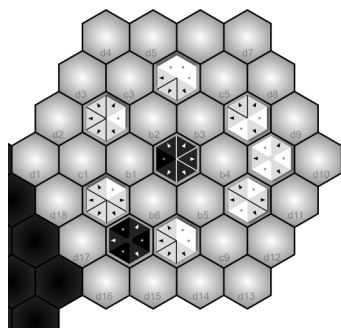
The two puzzles below were designed by Enrique Sedano. These puzzles do not show real game situations, but they may help readers get used to the manner of movement and capture in NXS. The arrows on a piece show the directions it can move; the number of spots on a piece is the maximum number of spaces it can move in a straight line; the lines on a piece show diagonals of attack.

In both puzzles, Black is to move. White may only move to capture. In other words, if White can capture an opponent's piece, she will do so on her turn. Otherwise, White does not move and Black has another turn. See page 4 for the solutions.



Puzzle 1: Find the shortest sequence of moves for the black Corvette to reach A without being captured.

Puzzle 2: Find the shortest sequence of moves for the black Man-o-War (the central piece) to capture all 6 white pieces without getting captured. Remember: Merchants (c7 and c11) cannot be captured.



References

NXS on Boardgamearena:

<https://boardgamearena.com/gamepanel?game=nxs>

NXS website: <https://nxsgame.com>



Winning Schnapsen

by Martin Tompa, Ph.D.

by Kerry Handscomb

This review of *Winning Schnapsen* should accompany the Schnapsen article, from page 39. The book and the article are both written by Schnapsen expert Dr. Martin Tompa. *Winning Schnapsen* is a rare book, about a single game that is not one of the "big" games: Chess, Bridge, Go, Xiang Qi, and so on.

Schnapsen is not a new game and indeed it has a long history in its native Austria and Hungary. According to the author, references to Schnapsen go back 300 years, and I suspect it was a popular game in the old Austro-Hungarian Empire of the Nineteenth Century. Schnapsen is still played in its native territory, but I think little known elsewhere.

Schnapsen is a card game for two in the large European class of point-trick and melding games. Every European country has its own versions from this genre. Collectively, they may be the deepest and most skilful of all traditional card games, maybe with the exception of some of the pure trick-takers, such as Bridge or Vint. Perhaps Schnapsen can compete for interest and depth with any other two-player trick-taking game, ancient or modern. Indeed, according to the author of *Winning Schnapsen*, Schnapsen is the best of all the two-player card games. He may be right.

Usually, points are accumulated in the point-trick and melding games during the play of a hand, from cards won in tricks and from scoring combinations "melded" from the hand. The number of points captured, not the number of tricks won, determines the winner of the deal. In Schnapsen, the points acquired during play are used to determine the winner of the hand, and then the winner scores game-points according to a different schedule. This is true also of Skat, for example. In contrast, in Pinochle or Bezique, the points won through tricks and melds are themselves counted as game-points. Sometimes the points accumulated during play depend mostly, or entirely, upon points won in tricks. Skat is such a game that depends completely on trick points, with no points scored for melded combinations. In Schnapsen itself, trick points dominate, but King-Queen "marriage" combinations also are scored. In games like Jass, or Klabberjass the trick points are still dominant, but a variety of combinations of cards can be melded and scored. In the Bezique games, and particularly in the larger versions such as Rubicon Bezique or Six-pack Bezique, melded combinations of cards are the primary way of scoring.

Schnapsen uses only 20 cards, which is fewer than any other game in the genre. The Bezique sub-genre evolved in the opposite direction, towards ever larger and larger decks—Eight-pack Bezique, for example, uses 256 cards. Perhaps few card games with a deck the size of Schnapsen's, if any, can approach the same level of interest. I suspect that Schnapsen requires as much or even more skill than any of the larger games in the genre, at least among the two-player games. I find it very interesting that the minimalist member of the point-trick and melding genre is one of

its most skilful representatives.

Now to the book itself. *Winning Schnapsen* begins with a first chapter covering the rules and some very basic strategy. Then, Chapters 2 to 11 each covers an aspect of the Schnapsen strategy and tactics. The author writes, “Surprisingly, no one seems to have written about this rich topic, in contrast to the many books on the games of bridge and chess.”

The chapter titles after the rules are Basic Plays, Force and Counterforce, Throw-in and Elimination, Expectation, Ducking Ruff, Tempo and the Last Trick, Inference, Squeezes, Role Reversal, and Deception. The analysis of game positions is detailed and interesting. The author uses characters drawn from his family history as players and kibitzers in the positions he illustrates. He has a light and easy writing style that prevents the book from becoming dry. *Winning Schnapsen* is both well written, challenging, and highly personal.

Good play in so many card games depends on remembering the cards already played, and Schnapsen is not an exception. Schnapsen has only 20 cards, which ought not to be difficult to keep track of. However, other aspects of the game require significant thought, which in my experience can easily displace a carefully hoarded recall of cards already played. The author gives brilliant advice on how to remember cards played and (more significantly) the cards remaining. To my mind, the small number of cards is an advantage of Schnapsen compared with many other card games, permitting the memory factor to take a back seat to technical analysis and strategy.

The final chapter is a collection of endgame puzzles accompanied by some of Dr. Tompa’s family history from the time of the dissolution of the Austro-Hungarian Empire at the end of World War I until the family finally settled in America in the 1960’s. Again, the story is interspersed with descriptions of Schnapsen deals with careful endgame analysis.

The material in *Winning Schnapsen* is fascinating and unique—and huge, with 440 pages. I do not know whether there are similarly comprehensive Schnapsen books in German or Hungarian, although the author’s bibliography does not list any. I suspect there is no book on Schnapsen comparable to *Winning Schnapsen* in any language.

Among the two-player card games, advanced Cribbage theory is surprisingly deep and interesting. The classic Piquet is also challenging and has been written about here and there. Bridgette, WYSIWYG, and Slam are also fascinating two-player card games. And, of course, there are dozens of modern representatives of the genre played with specialized decks. However, if ever I have the time and opportunity to focus on a single traditional two-player card game, it will now be Schnapsen, largely because this book is such a wonderful resource. If you wish to investigate a two-player card game with some history that somehow feels ultra-modern, then try Schnapsen. Then, if you do, you must get this book and study it. ■

Winning Schnapsen: From Card Play Basics to Expert Strategy

<https://www.amazon.com/Winning-Schnapsen-Basics-Expert-Strategy/dp/1515377369>

NXS Puzzle Solutions from page 3

“CW” and “CCW” refer to rotations clockwise and counterclockwise, respectively.

Puzzle 1: 1. c11-d15 d15CW, 2. d15xc9 c9CCW, 3. c9-c7 c7CW, 4. c7-c6. **Puzzle 2:** 1. axc6 c6CCW, 2. c6xc4 c4CCW, 3. c4xc2 c2CCW, 4. c2xc12 c12CCW, 5. c12xc10 c10CCW, 6. c10xc8.

An Interview with Stephen Tavener



The questions are organized under four different headings: (1) questions related to Stephen Tavener’s work as the developer of Ai Ai, (2) questions related to Stephen Tavener’s work as a game designer, (3) general questions about Stephen Tavener as a person, and (4) interesting supplemental questions. The questions are italicized.

The Ai Ai developer

Many readers know you from the software Ai Ai, a program playing many abstract board games. When did you start on Ai Ai? How many games does it play by now?

2015, kind of. Long, long, ago, around 2012, I started a PhD on Artificial Intelligence at Imperial College. Together with Cameron Browne, we designed MoGaL (Modular Game Library), which was a general game system formed from bits of Java code glued together by a JSON-like language. Unfortunately, that wasn’t a good time for the Tavener household, and I had to abandon the PhD; but a couple of years later, I dusted off the code and turned it into Ai Ai. There are still bits of MoGaL there—mostly Cameron’s graphics, which are much more professional than anything I would have come up with; and the games in the Unoptimized folder still use the original MoGaL routines.

It is still in development. I have a long, long TODO list of internal features, maybe some neural net support later on.

As of April 2020, Ai Ai plays around 172 games, though it depends on how you count variants. There is a game candidate list and a list of (ranked) implemented games. [See page 10 for all references. ~ Ed.]

What programming language do you use, and why? Would you still choose it?

Java. It’s fast; maybe not quite as fast as C++/C but within about 10% for the applications I’m interested in. It’s portable; the same

code runs on Windows, Mac, Linux. It's also really easy to add external game and AI classes. I would probably still choose it. There are a few upcoming languages like Go that I'd consider instead, but I don't think any of them are sufficiently stable yet. Java has proved that it's here to stay.

How large is the program?

In lines of code: UI 21,702; analysis library 17,450; core libraries 26,860; search library 2,621; games: 124,093. Of course, Ai Ai is very much a kitchen sink application, and there's a lot of code in there that isn't strictly necessary (like the fractal generator and Game of Life game end animations). Oh, and the search library currently contains 24 different Ai's. 😊

As Ai Ai is a general purpose engine, it plays different games at very different levels. What kinds of subgenre does it excel at; where are its weak points?

Ai Ai excels at games with a small state space, small boards (usually), and games that are fairly opaque to players, so Ai Ai doesn't have to think hard to beat them. So, the Ai Ai AI's are AlphaBeta (min-max pruning) or UCT (Upper Confidence Trees) based; and they have different strengths and weaknesses. UCT is the default, because there is little game-specific knowledge required, but it is driven by random playouts, so anything that affects the speed (complex rules, large branching factor, long games) affects the playing strength too. Example: Gomoku on a 19x19 board. Games which have one or two good moves amongst a lot of bad moves can also cause problems; movement/capture games like Chess often fall into this category. AlphaBeta is the fallback when UCT fails. In this case, I need to hand-craft the heuristics for the game—which can make the difference between implementing a game in a few hours, and implementing a game in a few days.

Which games needed a lot of additional thought, care, and code?

Almost anything by Nick Bentley (Bug, Carnivores, Blooms) is likely to cause me trouble. Chess-like games (Navia Dratp, Hermetica, Tank Chess, Cheaoss have all been problematic—I still need to revisit Hermetica and improve the heuristics. The most surprising game was Breakthrough, which was really tough—I think because humans can see the patterns and read ahead a long way.

I still can't tell you which games Ai Ai plays well—give or take a few trivial ones which are solved, I could make the AI stronger with more effort for any game you mention. People spend years making the perfect Chess engine (etc.) whereas I usually just spend a few hours; so I don't feel too bad about that!

I can tell you which is the worst game—Gess. The combinatorics are horrendous, and even with heuristics it plays very badly. I've rewritten the code from scratch once, and I'll rewrite it again at some point. [Update from Stephen just before publication: "After the second rewrite, it finally plays a decent game!" ~ Ed.]

Artificial Intelligence development has a branch called General Game Playing (GGP) which deals with programs not dedicated to a single game. Clearly, Ai Ai belongs there. GGP has many developers, some competitions and there is on-going research. Do you have connections to this scene?

Connections? A little: I did a little work for Zillions of Games back around the turn of the millennium, and I've done a little work for the Digital Ludeme Project. To a large extent, though, the Academics ignore me and I ignore them. Ai Ai probably doesn't qualify as a general game player in the strictest sense; most GGP programmes start with a language, and play games defined in that language; in Ai Ai, the language is little more than a set of JSON files used as glue to stick pieces of Java together. It can behave like a GGP if all the necessary modules are there, but more frequently I write the main game code in Java and just reference it from the JSON files for efficiency.

Why, you ask? Well, Zillions is undoubtedly the most successful GGP to date; you can implement almost any game with it, and I implemented quite a few back in the day. It does, however, have a number of missing features—connection goals and integer variables are the big ones. If you want to implement a game with either of these features you end up writing a lot of code; and Zillions will play the game very poorly as a result. I decided to go for a completely open ended system instead—all components in the system interact through a set of Java interfaces, and any game satisfying the game interface will work efficiently with any of the AI's. I can write optimized code for a single game, or an engine that will play a number of game variants with a minimum of configuration.

About the engines: I have an engine which supports several Go variants, another for Tafl variants, one for n-in-a-row games, one for the Tix family of games [see Tix on page 11 ~ Ed.], and I'm currently writing one for chess variants.

What about connection games (Hex, Havannah, etc.) and elimination games (Draughts or Checkers or Fanorona)—these don't need specialized engines?

Hex and Y have their own engine, but it's very optimized and won't generalize very far. Similarly, there are some cute optimization tricks I use in Havannah that would cost clock cycles instead of saving them in other games. UK Draughts fits nicely in an 8x8 grid, and has an efficient bitboard implementation. International Checkers uses a 10x10 grid, and needs a different internal representation. Also, maximal capture is a significant challenge.

Tell us about Ai Ai's optimisation!

In essence, Ai Ai expects a game to provide very little information; how many moves are available at a given node in the game tree, what's the state (ongoing/won/lost/drawn, etc), apply the n-th move. There's a bit more, but most of it is optional.

Each game/engine has to provide this information, and there is a strong trade-off between generalization and speed ("premature optimisation is the root of all evil," they say, but this is one of the few cases where every clock cycle counts!). If I can generalize usefully without hurting performance, I try to do so and make an engine, but very often it's better to write very specific code for each game.

*When adding games to Ai Ai, do you prefer new designs or would also you consider classics? For example, I know people who'd love to play Star, *Star and Poly-Y on Ai Ai; myself, I'd be so happy for Epaminondas or Focus.*

If the game is still in copyright I usually only implement games if I can get permission from the designer/publisher, or if there is a

clear signal that the game is in the public domain. Not always though: Connect 4 would be a case in point; n-in-a-row games are the drosophila of the AI community and Connect-4 has been part of Ai Ai since before I had a coherent policy on these matters.

With traditional games, it's clearly not a problem. With recent games, the author is usually willing to oblige though some publishers are reluctant to do so. There's that area in the middle, though, where someone owns the copyright, but they're not easy to contact. Ea Ea is an example—if someone can get permission from him, I'd be happy to add his games to Ai Ai. As mentioned above, the game of Y is already in.

The multitude of available games can be overwhelming. How do you deal with it? As a coder, how do you decide which games to implement?

True. The rate of new game creation has been increasing for a while. [See the interview with Cameron Browne in AG17.]. It's not just in the small world of abstract gaming, either.

There are three main reasons I implement a game:

- Curiosity; I've seen a game that I want to analyse for some reason; most recently Shobu (unfortunately, the publishers have an app in the pipeline, so I've not been given permission to release it).
- By request; I pick up games from the list of candidates when I fancy implementing a game or two. Thumbs help me prioritize but ease of implementation, how well I expect Ai Ai to be able to play, permission from the designer, and how much I like the game are also factors.
- The Combinatorial Game Awards on BoardGameGeek. I usually aim to implement as many of the finalists as possible (designers willing), to help folks make an informed choice.

A related question: how do you find games within Ai Ai?

I so often get feedback that it's hard to know where to start. That's the main reason for the list of ranked games.

You can also find related games through the Categories menu, and there's a search option in the File menu where you can type a keyword and find related games.



The game designer

You are a prolific designer yourself. Which of your creations make you particularly proud? If a reader is willing to inspect three Tavener games, which ones do you recommend?

Crosshairs, Mutton, Web of Flies, CHEaoSS, Sleepers, Four, and Knight Line are all what I wanted them to be, and I'm proud of them all.

Crosshairs captures the feeling of aerial combat, while being a game of pure skill. There are plenty of opportunities for big turns. Sadly, it's out of print at the moment but you can still play in Ai Ai.

Sleepers seems to be my most popular game. It's not combinatorial; there's random tile draw, hidden information, and even a little bit of memory but it can be intensely psychological and there are so many fun combos you can pull off that you want to keep playing.

Knight Line has an elegant simplicity to it, both in the rules and the components. All you need is a couple of stacks of square counters, and you're ready to go. At each turn, split a stack and move the top half a knight's move away (playing area must remain connected at all times). Make a line of four to win. Knights being what they are, Chess tactics can creep in; forks, removing the guard. There are also ladders and territorial elements. 😊

What do you think about new takes on old themes: Chess, Checkers, connection?

There's a great essay by T. S. Elliot, in which he says: "Immature poets imitate; mature poets steal; bad poets deface what they take, and good poets make it into something better, or at least something different." [The Sacred Wood: Essays on Poetry and Criticism, T. S. Elliot, 1920]

It's the same with game design. If a designer takes existing ideas and remixes them into something that plays differently (requires different ways of thinking, different strategies), that's great. If they make changes—no matter how large—that leave me playing the same game (or, worse, an inferior version) then why bother?

There are various qualities usually associated with modern abstracts: simplicity, depth, clarity, draw avoidance, balance. But you didn't specify theme! I am asking because your own games lean on the thematic side. Do you have an explicit reason for this?

I didn't mention theme so as not to muddy the waters; as a community, we can't agree on what an abstract strategy game is. 😊

So... yes, most of my games have a motif or theme running through them. As you may infer from the T. S. Elliot quote, I regard game design as a creative endeavour. As such, my game designs usually begin with an idea/theme/motif that won't go away. Four, ironically, is my third attempt to create a game based on the four colour theorem (see also Chroma; the other didn't work at all and has been consigned back to the depths). Crosshairs started with the phrase "caught in the crossfire" together with a disappointing experience playing Wings of War. Knight Line started with the desire to create the simplest game I could (in terms of material). Itsy was similarly motivated by an attempt to simplify Go as far as possible.

I believe that an abstract game has a higher chance to catch on if it has an intrinsic theme [See "Stories and Themes for Boardgames"]

in AG18]. *What do you think?*

I want to make some distinctions here. When people talk about theme in the wider hobby they are often talking about the dressing (beautiful plumage). This leads us to lots of soulless Euros with pretty artwork and nice wooden components where you are converting one colour cube into another until eventually you win by having a pile of victory points. A good theme helps you play a game, and the moves build a narrative/tell a story as the game progresses.

This can be hard to do with a lot of abstracts, but as you play Chess, for instance, it's easy to imagine a battle between two armies, fought over a series of exchanges, until one side is put into a hopeless position and capitulates.

This is one reason why I used the word "motif" earlier. Four is an example where there is a motif (4-colour theorem) but no narrative. Santorini is an example where there is a sense of narrative, of a story unfurling as the game progresses. The recently kickstarted Thrive (formerly Eigenstate) has a nonsense dressing involving ponds, which really doesn't resonate with me at all.

What is your opinion on why some games survive and others perish?

The enthusiasm of the designer and/or publisher is certainly a factor. Over and above that? I really don't know. People are strange. Most recent case in point is Shobu which seems to have made the crossover from hardcore abstract gamers to the wider hobby. The driftwood-and-pebbles presentation helps, and I suspect the lack of clarity probably does so as well. There's plenty of scope to turn around an apparently bad position that maybe appeals to a wider audience.

So you'd say that drama is important for an abstract's appeal these days?

In the wider community, certainly. In a discussion on Chess a while back, a friend said "I'm not a strong player but I like Chess because I can go along to a club and find a game at my level." Most of the modern abstracts don't have clubs, so you'll likely be playing with one or two friends who are willing to play two-player strategy games. If one player wins consistently, that game isn't going to get table space. This happened with my wife and I, playing Zertz for instance—we started out on an equal footing, and enjoyed the game; but then something clicked and I started seeing long forcing sequences. She had no chance after that point, and we stopped playing. A good handicapping mechanism may help, but if there are other games where a handicap is not required, why not play those instead?

So, drama helps level the playing field, and gives a player at a lower skill level more chance of winning. This is also why many of the most popular games in the abstract category on BoardGameGeek tend to have random elements.

Sleepers has 61 hexes, Mutton 37 and Crosshairs uses a base 6 hex-hex board. I get the feeling you prefer smaller boards?

Personally, I think there's something very interesting about a small board, even in games like Go. It distils the game down to its essence, and allows you to learn tactics and strategies that can then be applied to a larger board.

And speaking with my AI programmer's hat on; scaling up increases both the branching factor and game length, so it really

hurts the AI strength; Ai Ai likes small boards too! In human play, it depends on the game—sometimes it just makes them longer and reduces the clarity without increasing the strategy. I also like precision; finding the right move, rather than one of several that are good enough.

I'd also say that clarity increases. Oh, and you get straight to the action; some games have fairly long opening phases where the moves are pointless unless you're a strong player... and sometimes even then.

Also a factor, but even in Eurogames this is controversial: "We think that it is important that every single turn should matter. If you cannot lose the game on the first turn, then the first turn should not be played." (Joris Wiersinga, Splotter Spellen)

What's the smallest game you recommend?

Stacking is cheating, as it effectively increases the board size vertically, so the smallest good game I can think of offhand is Gyges, which is 6x6. There are very strong tactical elements (big turns), but strategic placement is important from the start once you get past the stupid blunder stage. It may also be that I really, really like tactics—I've played a lot of Chess over the years.

I recently did some analysis of games on a 3x3 board using Ai Ai, and found some surprisingly interesting games. Martian Tic Tac Toe, Traffic Lights, and Tak are all interesting, and bust the 3x3 restriction by using stacking. Tic Tac Chess is also quite challenging, (though the challenge is actually for the second player not to lose.)

Some games introduce a unique mechanism, such as Reversi's toggle capture, Hex's connection goal, the unification goal of Lines of Action, the Symple movement protocol. Each of these concepts is powerful enough to spawn successors. I'm very interested in mechanisms like these. Do you know others?

Shogi piece recycling. Action points—Conquest may be the first? Boardless boards such as Chex, Trax and many more modern mechanisms. The 12* protocol which is older than Connect 6, but that's where it was named. Dice as counters—Duell may be the first. Groups-as-organisms/perceptual binding: Carnivores, Bugs. I wonder what the first stacking game was? I can't think of any historic games with a stacking mechanism. Lately, I was impressed by Shobu, with the do something on one board, repeat on a different board. And the Sy- mechanism (grow each group, create a new one) which I shamelessly stole for Itsy.

What about some games or mechanisms you don't like?

I really dislike the chicken auction at the start of games like Unlur and Lyngk. Try not to make good moves for as long as possible? Ugh! And cold games? Hate them! Rithmomachy—so tedious, no wonder it was abandoned in favour of Chess!

Do you think that the quality of abstract designs has generally gone up?

Interesting question. I did a little research by looking through my ratings on BoardGameGeek, and overleaf are my favourite games by year—not necessarily the ones I rated highly at the time, but the ones I still pull out and play when the opportunity arises.

Overall, the number of good games per decade seems to be rising, but a lot more slowly than the number of games published, I think.

-2200 Go
 1475 Chess
 1883 Othello
 889 Boxes 1942 Hex
 1962 Twixt
 1967 Sprouts
 1974 Connect 4
 1975 Blockade
 1977 Mentalis*
 1979 Hyle/Entropy*
 1980 Trax, Interplay
 1981 Havannah
 1982 Chex*, Mandala*
 1983 Square Routes, Kamisado*
 1985 Gyges, Chase
 1986 Emergo, Gute Nachbarn, Plateau*
 1988 Axiom
 1991 Quarto
 1992 Amazons, Fibonacci, Billabong
 1993 Pylos, Char
 1994 Ko-An, Gess, Quantum Game*
 1995 Schlängennest
 1996 Gipf
 1998 High Kings of Tara
 1999 Octi, Zertz, *Star, Entrapment, Croak!*
 2000 Hive
 2001 Dvonn, Meander, Breakthrough
 2002 Fire and Ice, Farlander, Arimaa
 2003 Six, Connect 6
 2004 Santorini, Navia Dratp, Darter, Tasso*
 2005 Khet, Hinguere, Pilare 2006 Exxit
 2007 Tzaar, Tortuga, Barca, Mambo
 2008 Qyshinsu: Mystery of the Way
 2010 *Web of Flies*, Kings Plate, *Crosshairs*, Ayu, Morelli,
 Splits, Battle Sheep*, *Wizard Hex*
 2011 *Cheaooss*
 2012 *Four, Sleepers**
 2013 Cairo Corridor, *Knight Line*, Six Making, Schachadma
 2014 Onitama
 2015 Carnivores, Vault
 2016 Tak, Santorini
 2017 Bug
 2018 Blooms, Hermetica, Trailmazer, Tank Chess, Boom & Zoom
 2019 Shobu

Games with an element of randomness or hidden information that are not strictly combinatorial are marked with an asterisk; games by Stephen are italicized.*

The person

I know that there are real-life abstract games meetings in London. How strongly are you involved them? How many players usually attend? What games are played?

There's an abstract games meetup group that in normal times meets once a month in London—I'm the one who kicked the meetings off, and I usually bring the lion's share of the games with me—so yes I'm strongly involved.

The numbers are slightly strange—Meetup lists 177 members of the group, but the most we've had is eight players at a session. More usually, there are around four of us—so, not a big group. The joy of these games of course is that you only need two players. A bigger problem is an odd number of players.

The abstract games group is very much on hold now because of COVID-19. I look forward to reviving it as soon as the world returns to normal.

Before COVID-19, we used to play in a restaurant inside Waterloo Station on a Saturday afternoon; it's a great venue in terms of being easy to reach, classier and (more importantly) quieter than your average pub meeting. It is however quite limiting—if our numbers ever grew to double digits, we'd have to find a new venue.

I try to rotate the games each time, so there's always a different selection. Games played in the past have included: Amazons, Axiom, Barragoon, Chamelequin, Chase, Circle of Life, Darter, Dvonn, Gyges, Fibonacci, Gipf, Go, Green, Hive, Kamikaze Chess, King's Plate, Ko-An, Linear Pursuit, LOT, Murus Gallicus, Navia Dratp, NXS, Onitama, Othello, Paco Sako, Pylos, Quarto, Red, Santorini, Shobu, Sixmaking, Trax, Tasso, Trailmazer, Tzaar.

There are other abstract games groups in London; Chess, Go, and Shogi all have regular meetings that I know of, but I'm not involved in any of those.

Did you have ever have a “lifestyle game” (abstract or not)?

No, never—as I kid I was already splitting my time between Chess, Bridge, Scrabble, and Dungeons and Dragons. I played a lot of Magic: the Gathering for a while (and still play, 25 years later), but even then I was still playing a lot of other games.

What are your hobbies besides board games?

Taijiquan, painting miniatures, baking chocolate cakes, weight lifting. I also read a lot of SF, Fantasy, and detective fiction maybe 100 books per year these days. I have one cat and only the one snake but that belongs to my eldest child. I love puzzles! Particularly Slitherlink. When it comes down to it, puzzles describes almost everything I do. Not a hobby: I am autistic.

I believe that you pursue games and Ai Ai in your spare time. What is your profession?

I'm a computer programmer by inclination; sadly, I spend most of my time telling other people how to write code rather than writing it myself these days. As you say, Ai Ai is a hobby—a chance to write code, rather than watching other folks do it! Game design is quite strongly linked to Ai Ai—if I have an idea for a game design, I'll code it and test it.



Like your game design and coding, writing about games is a spare time matter for me. This has the big advantage that I'm free: I can pursue strange decisions. Do you have a similar feeling of freedom?

Indeed, yes. I implement games that interest me, get to try out new AI techniques (most of which don't work), and indulge in micro-optimizations—most of which I couldn't do in a commercial setting.

You've mentioned autism. What is your experience with that?

I haven't been formally tested, but my oldest child has. There's a genetic element, and I have other traits that are strongly associated with the same gene, like prosopagnosia (face blindness). The realization puts a lot of my life into perspective, and I wish I'd figured it out earlier than I did! I think autism is very common in both computing circles and amongst abstract gamers; you need an atypical way of thinking to excel at either, as well as a strong ability to focus on a problem. Autism is a superpower!

Supplemental questions

Which games have you added in the last few months?

As of October 2020, Ai Ai plays around 228 games, though it depends on how you count variants. Here is a list of (ranked) implemented games. Every year I try to implement (designers willing) as many of the 2019 combinatorial award entries as possible. This year, these were:

Linear Pursuit	Wizard's Garden
Iris	Mammalath
Wunchunk	Tabula Trivium
Pinch	Keil
Exo-Hex	Othellito
Poka Yoke	Jaleo
Chess+	Make Muster
Mapmaker	Benediction
Alliances	

Of the finalists, only Shobu (permission refused) and Uptown (it's 3D, which I can't do proper justice to at present) are missing.

After that, some Polish researchers drew my attention to some inefficiency in my older implementations, I did a round of going back and cleaning up some older games with newer tools that I've developed. The most notable achievement there is that my Gess implementation may actually beat a human being occasionally!

Shiny new games that I've implemented are Meadow (Nick Bentley), Slyde (Mike Zapawa), and Furl (Stephen Tavener). Older games that I've implemented are Fanorona, Canadian Checkers, and International Checkers. Arimaa made a brief appearance, but there's a license so I pulled it again. I have asked the designer for permission, but haven't heard back.

Some small games I've implemented for my 3x3 UCT [Upper Confidence bounds for Trees] rankings are Knight Through, Hexapawn, Traffic Lights, Achi, Three Mens Morris, and Tic Tac Chess. Coming soon is Chess Line (a generalization of Tic Tac Chess with improved play).



You have used Ai Ai to set up a UCT based skill ranking for small games. Can you say something about how and why that works?

There's a recurrent topic on the BoardGameGeek forums, where players try to assess the depth of a game in terms of the number of skill levels it can support. The discussions seldom go anywhere, because depth is one of those "I know it when I see it" things that seem hard to pin down to a single metric. It occurred to me, however, that I could side-step the issue and define something concrete.

UCT is a form of AI which builds a tree from random simulations, focusing on the branches of the tree that give the best results. It has a number of properties that make it very suitable for building this kind of skill chain that other AI's lack:

- You can stop any time; for AlphaBeta and Minimax searches, you must complete a pass or the results are unreliable.
- Again, unlike AlphaBeta search, there is no need for heuristics which would introduce human bias.
- UCT is known to approach perfect play as the computing resources invested increase (albeit slowly); this is not necessarily true of neural nets.

This means that I can start with a very weak AI (analogous to random play) and very slowly increase the strength, marking levels as they occur.

What are the limits of this very interesting approach, for theory and for practice?

Given sufficient processing power, this process will return a consistent metric that can be applied to any game. How closely this measures the human concept of depth is a bit more problematical. I have been running some tests for very small games on my laptop for the past few weeks, focussing on very small (3x3) games which are (mostly) easily solved; so I am in a position to give some examples. Here are some "pure" 3x3 games (those with a single piece type) I have investigated:

Game	Levels
Hexapawn	4
Tic Tac Toe	7
Breakthrough 3x3	7
Go 3x3 (7.5 komi)	8
Hex 3x3 (no swap)	8
Achi	9
Three Men's Morris	10
Tic Tac Chess	10
Hex 3x3 (with swap)	12

I'll just quickly point out a few highlights; first, there's a game worse than Tic Tac Toe; Hexapawn was apparently invented by Martin Gardner in the 1960's as an example in an article about AI; looking one move ahead is sufficient for the second player to play perfectly (and win).

Secondly, note that the universally maligned Tic Tac Toe actually has a whopping 7 levels of play which I'm sure most adults will find surprising. It would be interesting to work with young children and find out if these are really there and invisible to most adults or whether they are artifacts of the UCT algorithm—all games I tested have several skill levels just above completely random—all I can really say is that they are consistent.

Finally, I'd like to highlight the difference that the swap

rule makes in Hex; the UCT skill levels jump from 8 to 12, suggesting that I'm measuring something useful!

Now on to the practical constraints. For these 3x3 games it typically took a few minutes to one hour to generate all skill levels. As the board size increases, however, the branching factor increases (often with the square of the board size) and the game length increases as well, so the difference between a 3x3 and 4x4 game is already huge. For more complex games with differentiated pieces and/or stacking on a 3x3 grid (e.g., Martian Tic Tac Toe, Traffic Lights) a 10-hour run wasn't sufficient to find the highest level of play, so most larger games will quickly run into processing and memory limits before we can fully analyse them; nonetheless, a short run for a large game may still give valuable information about the lower levels of play.

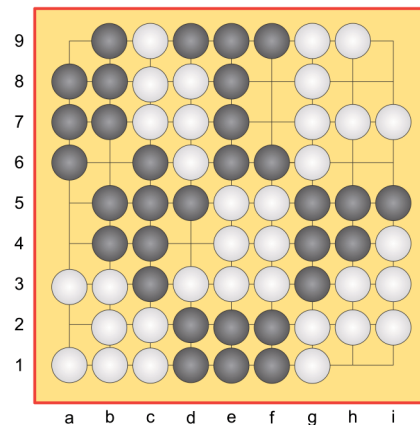
I should point out that this is a new and shiny tool, and I'm still refining my understanding of what it can tell us. A link for my current findings is listed in the References, but that's not the end of the story by any means. ■



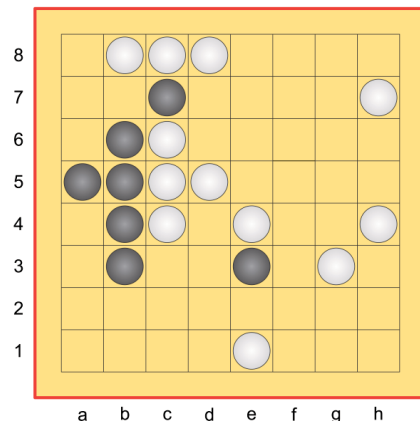
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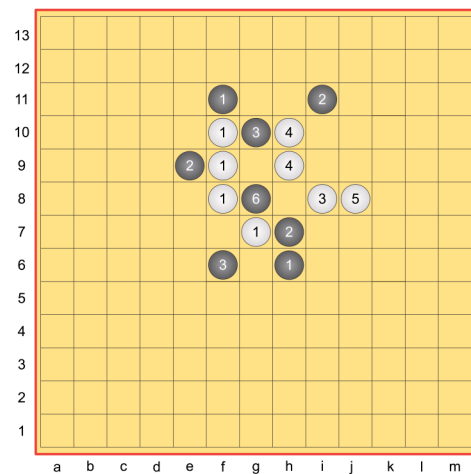
Many thanks to both Stephen Tavener and David Ploog for this detailed and interesting interview. Stephen has been a significant contributor to the world of abstract games for many years, obviously through Zillions of Games and Ai Ai, but also through his own games. I hope we can investigate Crosshairs or one of Stephen's other titles in a future issue. Stephen was a valued writer for the old series of Abstract Games, with articles on Zèrtz in AG6, AG7, AG8, and AG9. Please see below three challenging problems found by Eric Silverman utilizing Ai Ai, for Symple (AG19), Lines of Action (AG1, and others), and Stephen's own game Knight Line. The solutions are on page 1. ~ Ed.



Symple: Black to play and win in 6 moves (noting that a player may place several stones in a single move); P=4.



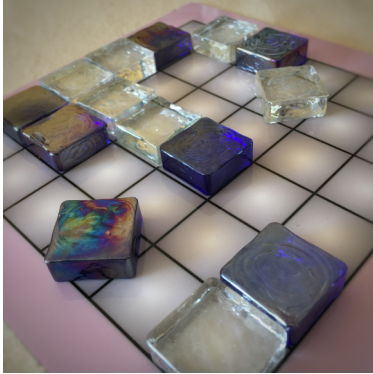
Lines of Action: Black to play and win in 9 moves.



Knight Line: White to play and win in 9 moves.



The rules of Knight Line, quoted directly from the Knight Line BoardGameGeek page are as follows: "Knight Line is a minimalist connection game for two players. Each player has 20 square tiles in their colour; at the start of the game, these tiles are placed in two adjacent stacks, one of each colour. A move consists of moving part of a stack (at least one tile must be left behind) to an empty space by making a knight's move. All pieces must be connected at least diagonally throughout the game. The first player to make a line of 4, orthogonally or diagonally, wins. To offset the first player advantage, they must move only a single piece on their first move." ~ Ed.



The smallest details can make the biggest difference: A Review of the Tixel Family

by Pablo Schulman

On February 1, 2020, designer Martijn Althuisen sadly left this world. Martijn was from the Netherlands and only 46 years old. I had some interactions with Martijn regarding his games and he always struck me as someone passionate about his craft and always eager to push the envelope and experiment with new, quirky ideas. He was always polite and available to answer questions and explore suggestions made by anyone interested on his games. With this review, my intent is to honour part of his work and shed a light on his most well-known designs, collectively known as the Tixel family.

A quick search on BoardGameGeek shows those were the designs Martijn spent the most time on, from 2007 to 2019, spanning a total of six games. Although the Tixel series/family is comprised of six members, most would consider only four of them, given they share the most similarities, as well as a publishing/designing evolution of sorts. They are, in order of design: Tix, Tixel, Regatta, and Poka Yoke. An attentive reader may notice that, although Tix is the first in chronological order, it is Tixel that names the family. The reason for this is that “Tixel” is the game that was actually published by Nestorgames, with add-on expansions allowing one to play Tix and Poka Yoke, but not Regatta (for clear reasons below). Therefore, it makes sense from a marketing standpoint to name the series after its flagship game.

The games are played in a square board of at least 6 spaces per side that may or may not have bounded edges. Bounded edges mean pieces cannot protrude beyond the edge of the board and it is only recommended for board sizes of 8 or larger. The pieces, the star of the show, vary in quantity, variety and shape between games: Tix is played with 8 square pieces (from now on called Tix pieces); Tixel is played with 10 pieces, each of which has one hollow edge (the Tixel pieces); Regatta has 21 pieces, each with one hollow edge and one rounded corner (the Regatta pieces)—see Figure 1. Poka Yoke does not introduce a new type of piece and is played with 10 Tixel pieces but allows two of them to be promoted to Regatta pieces. The interesting thing about the Tixel family is not the shape of the pieces itself, but how Martijn made them interact with the board and each other. A piece adopts two different states: active, which means tilted 45° so its corners are outside the board squares; and inactive, when its sides are aligned with the board squares—see Figure 1. Only an active piece can be slidable (i.e., moved), but this requires it to have the space to do so. This is important, because games effectively end when one player does not have at least one slidable piece, and cannot make a move.

On a player’s turn, the player must either add a piece to the board or slide a slidable piece.

To add a piece, the player must have at least one slidable piece on the board—except, of course, for the first piece that each person places. When adding a piece, it must be placed in an active

stance if the spot allows for that. In Tix, a piece can be placed in an active position if there are no orthogonally adjacent squares that are occupied, for otherwise its corner would protrude into an occupied spot. (In Tixel and Regatta, a piece can be placed in an active position even with adjacent occupied squares, provided the adjacent pieces have the right orientation to allow an active piece to intrude on their square without overlapping.) Pieces can be placed on spots where they must be inactive.

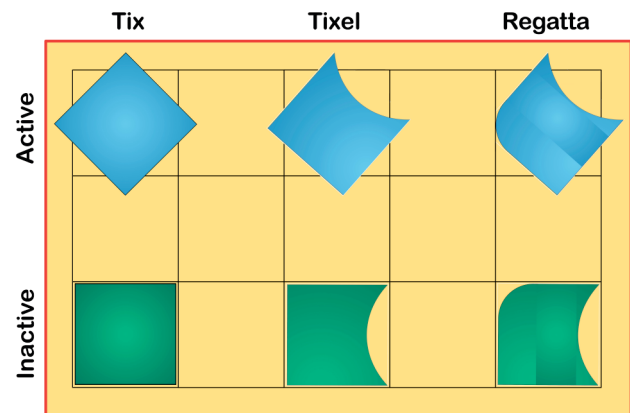


Figure 1: Tixel family of pieces.

To slide a piece, the piece is moved any number of empty squares orthogonally in a straight line. To slide a piece, a player first pivots the piece to an inactive stance (tilting it by 45°), and then slides it orthogonally to the desired spot, activating it again if possible (Figure 2A). During its sliding movement, it inactivates pieces that it passes next to and may also end up inactive. Active pieces flanking both the sides and end of its movement path are made inactive. In the case the sliding piece becomes inactive, the active player gets an optional bonus move (Figure 2B)

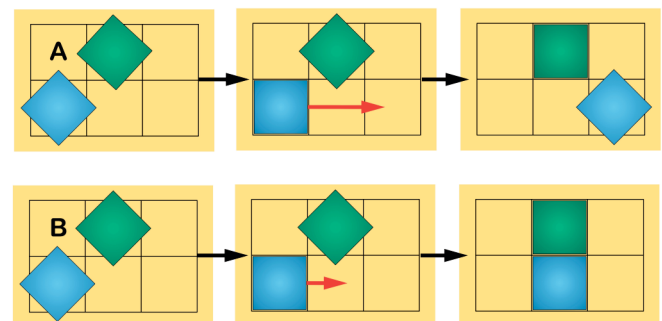


Figure 2: Standard sliding protocol. The blue piece is deactivated, slid (deactivating pieces it passes near), and then activated, if possible (like in A). In B, white gains a bonus move.

The available bonus moves vary with each game and are the following: ADD a piece to the board, following the standard procedures; SLIDE another piece (with a bonus move if the slid piece ends inactive); REMOVE a friendly piece from the board back to the player's reserve; ACTIVATE an inactive piece by rotating it, if possible; PIVOT a Tixel or Regatta piece in quarter turn increments; and PROMOTE the first two removed Tixel pieces to Regatta pieces (in Poka Yoke). The game continues turn by turn, with alternating turns, until one player cannot make a move, in which case the player loses. The differences between the games of the family are summarized in the table below.

The play of the games differs as a result of three factors: the type (and number) of pieces, the official size of the board, and whether or not the board edges are bounded. Most interesting for the discussion is the type of piece, since different pieces lead to different bonus-move and tactical possibilities. This is the question I set myself to answer in this essay: How does the shape of the pieces influence gameplay. Since I am most familiar with Tix, and I did not want to play the three other games *ad nauseam*, I decided to enlist the help of Stephen Tavener's Ai Ai. Ai Ai is a Java-based general game-playing engine based on Mogal (an earlier system designed and developed by Stephen himself and Cameron Browne). Ai Ai features many games and is capable of generating reports by playing itself over a period of time. Many thanks to Stephen Tavener for allowing me to use his engine, and I cannot stress enough just how powerful a tool Ai Ai is, for abstract game players and designers alike. See the interview with Stephen Tavener in this issue.

In order to see the effect of the pieces, Regatta was set to have the same board settings (6x6, unbounded edges) as the other games. To compensate for this, 6x6 Regatta was arbitrarily set with 15 pieces per player. Although the investigation did not use the same ratio as standard Regatta, one should remember that the Regatta official rules ask for bounded edges, which makes edges more deadly. Bounded edges require a Regatta piece to have its square corner facing inwards, increasing the interaction between pieces; while on an unbounded board, a Regatta piece can be placed with its round corner inwards instead, making it less prone to inactivation. This number of pieces more than satisfied the goal of limiting the draw rate, due to the extra liberties of the pieces (see the table overleaf

It is easy to understand why the branching factor is higher in Tixel and Regatta than in Tix: their shapes allow for orientation during placement, while Tix pieces do not. For example, Tixel pieces can be placed with their hollow side facing NW, NE, SW and SE adding 4 options in every single possible active placement. This factor is even more drastic for Regatta pieces, since they also have reflection, totalling 8 active possible orientations.

The changes also affect how the pieces interact with each other. Tix pieces effectively block active pieces being placed in or slid to squares orthogonally adjacent to them, while Tixel pieces can be placed or slid in an inactive state with their hollow side facing the active piece, and Regatta pieces can be active if both pieces have their rounded corners facing each other (Figure 3).

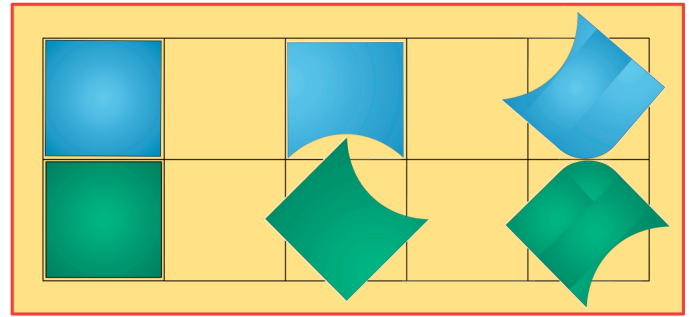


Figure 3: Ways in which the different piece types can interact with each other.

Where pieces can interact more, the game length should increase, if stalemating your opponent is the goal. In addition, it makes the game less decisive, since it is easier to find active placements and slides that are undisturbed by other pieces. What was observed is that Tix and Regatta shared a similar game length, both smaller than Tixel. The results for Tix were as expected, but not for Regatta. Regatta's shorter games (than Tixel) might be due to the more forgiving shape of Regatta pieces—they allow for easier reactivation after slides, limiting the number of bonus moves. A lot of the length comes from bonus moves, since Ai Ai counts them just like regular moves. The higher interaction of Regatta pieces justifies the higher board coverage in this game, but not in Tixel. Tixel showed more bonus moves than Tix, meaning more chances to remove pieces, probably reducing board coverage in this game.

Games showed a bias towards the first player, with a 67.30, 65.75 and 65.95% win rate in 6x6 Tix, Tixel, and Regatta,

Feature	Tix	Tixel	Regatta	Poka Yoke
Pieces per player	8	10	21	10 Tixel 2 Regatta
Board size	6x6	6x6	8x8	6x6
Board edges	Unbounded	Unbounded	Bounded	Unbounded
Bonus actions	- Place - Slide - Activate - Remove	- Place - Slide - Activate - Remove - Pivot	- Place - Slide - Activate - Remove - Pivot	- Place - Slide - Activate - Remove - Pivot - Promote

Aspect	Tix piece	Tixel piece	Regatta piece
Game length (a)	36.38	48.65	38.84
Branching factor (b)	27.05	117.17	177.97
Complexity (log10) (c)	46.27	82.74	75.62
Board coverage (%) (d)	52.58	46.43	59.79
First player win (%)	67.30	65.75	65.95
Draw rate (%)	4.20	5.10	0.90

(a) Average number of moves in a game (including bonus moves); (b) Average number of moves in a turn; (c) Based on game length and branching factor; (d) Mean average of board locations used per game.

respectively. (Note: standard Regatta also has a first player bias of 61.60%). Firstly, it is always important to highlight that win/loss statistics may vary depending on thinking time (the horizon effect, etc.), bad heuristics, bugs, and other factors, so they should be taken with a pinch of salt. However, win/loss statistics can be used to indicate how suitable the game is for competitive play between non-perfect human players. As usual, one can consider using the pie rule, but it would take a substantial number of recorded games to find a first move that would result in balanced chances, so I am not confident in providing a possible balancing first move.

Another balancing option is playing two games with alternating positions. I believe this is only an option if the game has a built-in scoring system, which the Tixel family lacks. A possible quantitative measure to gauge success could be how many tempi the winner has after stalemating their opponent, which would be the number of slidable pieces on the board plus remaining pieces in their reserve after winning the game. It is possible for a game to end with the loser having more pieces in reserve than the winner (if the loser focuses more on moving than placing), in which case it might be better to reward the winner points equal to slidable pieces on board plus total number of pieces in both players' reserves. That may mean shifting the game more towards a placement game, which the designer disliked (something we discussed years ago), because it would take the focus away from what he thought was the most interesting aspect of the game: "en passant" inactivations and combinations.

As an exercise, I tried another approach. I set unbounded 6x6 Tix and Tixel with the second player owning an extra piece. My reasoning was that this off-board material advantage could offset what might be the first player's advantage of an early presence on the board. That seemed to work for both games: the first player won 53.20% and 59.70% of the games in Tix and Tixel, respectively (instead of the nearly 67% and 65% with the standard rules). A following report showed Tixel could be further improved with a second extra black piece, the first player winning 56.75% of the games with this setting (with the collateral effect of reducing draws by half—see the argument below). I leave Regatta's and Poka Yoke's improvement to the reader.

By the rules, it is not possible to draw in the sense of a tie, so the tie results found by Ai Ai are games that were abandoned after a certain number of moves (according to Stephen, this amount is set to 512 moves at present). This is a consequence of gameplay. At the beginning of the game, players jockey for protective positions for their pieces and, after some inactivation

exchanges, defensive pockets where players can slide pieces back and forth naturally occur. See Figure 4, where Green and Blue can both move their active pieces one space up and down indefinitely.

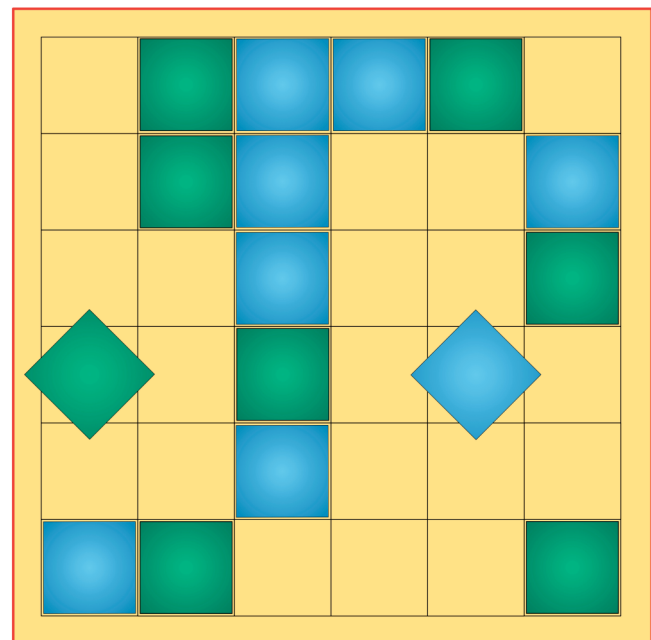


Figure 4: Drawn Tix endgame.

These kinds of draws are reflected in Tix and Tixel, which have around 5% of drawn games each. Regatta does not have so many draws, because of the number of pieces I set to each player—the amount was high enough that players could slowly chip away at the safe spots of their opponents, squeezing the active pieces until they could no longer move (even considering unbounded edges). Other simulations (data not shown) showed a greater than 10% draw rate in unbounded 8x8 Tix and Tixel, as well as in standard Regatta. I do not mind a 5% draw rate, but for the more draw-adverse out there, the most logical solution is to add more pieces to a player's reserve. For example, in Figure 4, an extra piece would give a victory to the player moving last. I suspect one or two extra pieces will be enough in 6x6 Tix and Tixel, while unbounded 8x8 Tix and Tixel and standard Regatta would benefit from 2 to 4 more pieces. Again, this would mean a shift towards more placements, which Martijn was not fond of. In case an extra piece is not

available, a threefold repetition or Ko rule may be warranted.

Statistics aside, the game feels quite tactical, with players jockeying for position and trying to create safe spots. At the beginning, players spread pieces and try to create formations to avoid their pieces being inactivated by slides. As the game progresses, it is hard to avoid inactivation opportunities and inactive pieces start to clog the board, making it hard to find placements as well as creating some safe spots. The endgame is a matter of saving tempo and chipping away the opponent's safe spots, making the opponent spend reserves until forced to move the last active piece. Aside from the shape of the pieces, the possibility of several extra turns, in the form of bonus moves, is one of the most interesting traits of this game. To find a string of bonus slides that allow you to inactivate several opponent's pieces, shifting the game into your favour, is akin to the opportunity to set off a brilliant multiple capture move in Checkers.

For those that really like puzzly, tactical games, I recommend the Tixel family. It is different from almost anything that I have seen in terms of abstract games and engages players in a different way. The piece tweaks create more rules that definitely add complexity and choices, but also cause a certain amount of analysis-paralysis. Also, they add some decisions during placement that I feel are too opaque: I find it hard to visualize the consequences further down the road of such and such way of placing a piece. This is exacerbated in Regatta, given the complexity of the pieces and considering the standard board for this game is 8x8. Because of that, the best order to learn the games is Tix, Tixel, Poka Yoke, and lastly Regatta. I know I did not discuss Poka Yoke, mostly because I was focusing on the type (instead of the variety) of pieces, but the game might be a good middle ground between Tixel and Regatta. Caveat: Poka Yoke also had a first player bias (67.50%), so adjustments of the number of pieces (and/or possibly the number of promotions) could be explored—though not by me!

Conclusions

- Avoid large board sizes, they increase the number of draws (unless using extra pieces to account for that).
- An uneven number of pieces offsets the first player advantage.
- One extra black piece is enough for 6x6 Tix; two improve 6x6 Tixel.
- Unbounded 6x6 Regatta seems to be viable (in terms of draws), although some tests are required to find a number of pieces that could offset player bias.
- I still prefer Tix, and could see myself going for Tixel, but not 8x8 Regatta.
- AiAi is awesome.

On a more personal note, it is my hope this review and analysis has shown readers a little of Martijn's work. Believe it or not, he designed even more unusual games throughout his short life, and readers are encouraged to explore some of those games. Not only his death, but Eric Solomon's (author of Hyle, Billabong, Black box, among others) and Rich Gowell's (designer of Entrapment) made this a sad year for abstract game enthusiasts. Martijn and Rich, in particular, were members of the BoardGameGeek forum, and we often had discussions in the Abstract Games sub-forum, which make their deaths more impactful to me. To all of them, rest in peace. ■

Header image: Craft-store glass mosaic tiles on a 6"x6" board printed on aluminum.

Schada

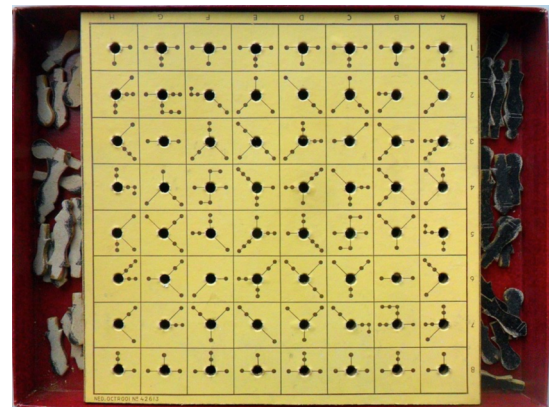
*"The greatest
measure of thought
in the world"*



Jan Boogerd with Schada,
De Tijd, June 24, 1974

by Fred Horn and Kerry Handscomb

On June 24, 1974 the daily newspaper *De Tijd* published an article about Jan Boogerd from Rotterdam, inventor of "De grootste denkmeter ter wereld [The greatest measure of thought in the world]"—in Boogerd's own words. At the time, Jan Boogerd was 77 years old, and he gave a contact address in Rotterdam. Boogerd is quoted as saying, he thought Schada would be republished. Schada was not subsequently re-issued, but the game has an interesting history spanning World War II.



World War II era cardbaord Schada set.

According to the researches of Fred Horn, Schada was developed by Boogerd around 1937. The game was published by Groenteman & Co. and actively promoted. Several versions of Schada were manufactured before and during World War II. The paper *Het Vaderland* of December 13, 1937 reports on a Schada demonstration, and in the rules from 1939, Boogerd himself cites the Rotterdam Individual Championships of 1938 and 1939.

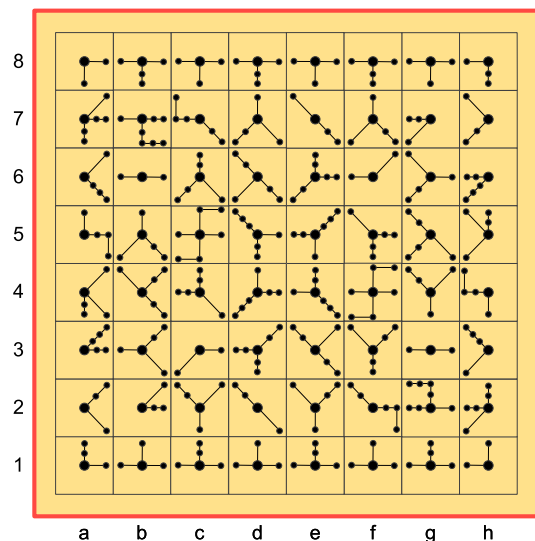


Sperry and Co. flier, 1938.

Despite the initial interest in Schada, it did not survive for long after the end of the war. Nevertheless, Schada is an interesting game of its type, reminiscent of games such as Tripples (AG7), Quandary (AG13), Take the Brain (AG9), and the more recent Katarena (AG17). Schada, in other words, is one of those games where the board spaces have special powers.

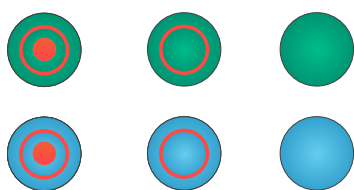
Rules

The rules here are based on the rulebook by Jan Boogerd (1939, Rotterdam), which was obtained by Fred Horn from the Koninklijke Bibliotheek in Den Haag. However, the rules below are rewritten, rather than a simple translation, with diagrams and commentary, and hopefully some clarification.



Schada is played on the board shown above. Our reproduction of the board is close to the original, although there are minor cosmetic changes. The original pieces were peg-like, and fitted into the holes on the board, like a travel Chess set, and these holes are indicated by the larger circles in the centre of each square. The lines with the smaller circles on each square display the directions and numbers of squares that a piece can move that occupies that square. The lengths of the lines is irrelevant. Each dot on a line just means one square in that direction. You will see that the top half of the board is simply a 180° rotation of the bottom half of the board. Some of the squares (f2, f4, g2, and h4) specify that a piece must even change direction during its move.

There are three kinds of pieces, *Field Officer*, *Officer*, and *Pawn* (respectively, *Hoofd-Officier*, *Officier*, and *Pion* in the original Dutch). These are shown below, respectively, from left to right. The Field Officers and Officers are collectively referred to as *high pieces*. I have shown the pieces in blue and green, although the original pieces were shades of brown and white and black. The circular markings on the pieces are purely symbolic, but are meant to represent the kinds of designs used for actual Schada pieces.

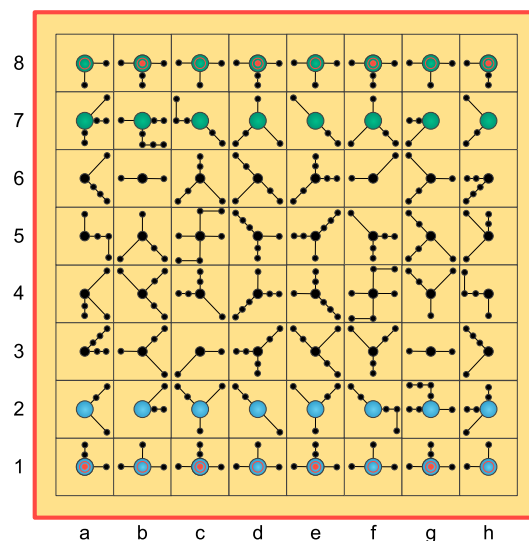


Field Office, Office, and Pawn, respectively.

One player takes the blue pieces, the other takes the green. Each army consists of four Field Officers, four Officers, and eight Pawns. The starting position is shown below. The pieces must necessarily be compact so as not to obscure the movement indicators on the board.

A player's *base line* is the row of squares closest to him, which contain his high pieces. His *goal line* is the row furthest

from him, containing his opponent's high pieces. Note that the Field Officers face enemy Officers, and vice versa.



The direction a piece can move and the number of squares it can move is indicated by the square it stands on. For example, a piece on d3 could move to d1, a3, or f5. As I mentioned above, a piece may have to change direction during its move. A piece on f2, for example, can move to d4, but also to h1. A piece must complete its full movement. For example, the piece on f2 cannot stop on g2 or h2 in its journey to h1. All squares along the way must be empty of both enemy and friendly pieces, except if the last square in a move is occupied by an enemy piece. In this case, the enemy piece is captured and removed from the game, and the moving piece takes its place. This is capture by replacement, common to Chess. The Field Officers have an exception in their movement rules: a Field Officer can pass over squares occupied by friendly pieces in the course of its move. No piece can ever land on a space occupied by a friendly piece.

From the starting position, you can see that each of the eight Pawns can move, and the c2 and e2 Pawns have two movement options. The Field Officers on a1, c1, e1, and g1 can each move forward over the intervening Pawns to the third rank at the start of the game. Therefore, there are 14 possible moves from the opening position.

The object of the game is to move your high pieces into your goal line.

A high piece can shuffle left and right on your base line, perhaps to prevent an opponent's high piece from entering your base line. However, once a high piece has left its base line, it cannot return to it. On the other hand, once your high piece reaches its goal line, it can shuffle left and right on the goal line, perhaps to make way for one of its colleagues or block an enemy piece, but it cannot leave its goal line. The Pawns have no restrictions on movement in and out of the base line or goal line. Their role is to defend and support the high pieces.

High pieces that have reached their goal line cannot be captured although they can still capture enemy pieces. Otherwise, any type of piece can capture any other type of enemy piece, without restriction. Capture is not compulsory.

The game ends as soon as all of a player's remaining high pieces (those that have not been captured) are in the goal line. The move that accomplishes this objective finishes the game immediately.

(Continued on page 24.)



Algae bloom, San Francisco Bay,
aerial view.*

Blooms

More than Hexagonal Go

by Thibault Pillon

Blooms is Nick Bentley's take on Hexagonal Go. Nick claims it solves the problems arising when Go is ported directly to a hexagonal tessellation. Before we find out if that is true, let us recall the main issue with Hexagonal Go.

Hexagonal Go's most obvious problem is that each cell has six neighbouring cells instead of four. In a game where you catch opponent stones by reducing their liberties, the hunted quickly outruns the hunter. Cross-cuts are another key aspect of Go:

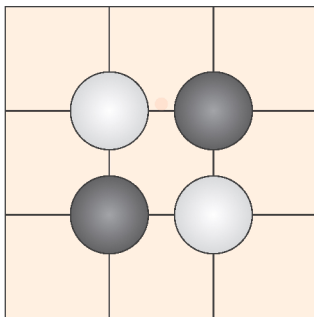


Figure 1: A cross-cut in Go.

A cross-cut is a meeting point, where both players end up with two disconnected groups. In Go, cross-cuts are aggressive play, usually provoking big fights, since losing a cross-cut stone effectively allows your opponent to connect her two groups on opposite sides of the cross-cut, giving her a big advantage.

But cross-cuts do not exist on hexagonal tessellations. To see why, observe that playing on the cells of a hexagonal lattice is equivalent to playing on the vertices of a triangular lattice. In classical Go, cross-cuts are formed around a cell of the square lattice where each diagonal is occupied by stones of a given colour. On the other hand, a triangle cell with all three vertices occupied always contains a pair of stones of the same colour. This means the stones do not mutually disconnect each other. It is for this very reason, by way, that Hex cannot end in a draw. When you play Go

on a hexagonal board, the extra liberties and lack of crosscuts limit your attacking options, which makes the game dull.

How should we fix this? Let us focus on two ideas: Keil and Trigo. Keil was deeply covered in *AG18*. It deals with the board's high connectivity by restricting the notion of connectedness in a strange, yet clever, way. The upside is it does so effectively and recreates cross-cuts. The downside is it feels unnatural. In addition, you can argue that, though Keil is played on a hexagonal board, the game's underlying topology is not a hexagonal tessellation, but a strange network of points and edges influenced by the game state.

Trigo is simply Hexagonal Go with a 12* rule. (See David Ploog's discussion of movement protocols in *AG19*.) Except for the first player's first turn, each player can play two stones on each turn. This balances the advantage of playing first, since each player ends her own turn having played one more stone than her opponent. (In a normal game of Go, this is dealt with using *komi*, which grants a few extra points for the second player.) More to the point, it is also an attempt to deal with the board's high connectivity. Groups with few liberties are more at risk, groups now need three eyes to live, and solid shapes like bridges (i.e., "diagonal" connections) are no longer unconditionally connected. However, the additional attacking power is counter-balanced by additional defensive power: you get two consecutive plays to get out of tricky situations.

Blooms follows the second idea with a twist. It is Go, on a hexagonal board, with a 12* rule, where each player controls two different colours. After the first player's first turn, each player places one stone of each of her colours on every turn. A player may also place only one stone per turn if she wishes, which will mostly happen at the game's end, when playing stones in your own territory hurts you.

The key point of this rule, which will baffle the Go player at first, is that a group is surrounded, and thus captured, when all its liberties are occupied by differently coloured stones, even if they are friendly. In other words, you can and will take your own liberties when playing.

Rules

(From <https://www.nickbentley.games/blooms-rules/>, with terminology modified to align more closely with that of Go)

- Blooms is played on the spaces of a base 4, 5, or 6 hexhex board. Larger sizes, too, are playable. Player 1 uses Red and Yellow stones; Player 2 uses Blue and Black stones.
- Player 1 places a Red or Yellow stone on an empty space. Then Player 2 places one or two stones of her colour on one or two empty spaces, and if Player 2 places two stones they must be of different colours.
- Thereafter, the players alternate turns, placing one or two stones of their colour on empty spaces, with the proviso that two stones placed must be of different colours.
- A *group* is a connected set of stones of a single colour; a group has *liberties* if it has adjacent empty spaces.
- After placing one or two stones, a player captures all *enemy* groups with no liberties by removing them from the board.
- The first player to capture a pre-determined number of enemy stones wins the game. The author recommends 15 for a base 4 and 20 for a base 5. For larger sizes, players may experiment, with 25 or 30, say, with base 6.

Now I will discuss Blooms in greater depth. First, I will illustrate how Blooms overcomes the extra liberties and lack of cross-cuts on hexagonal boards. Second, I will note some features Blooms and Go share in common, like cyclical repeating positions. Third, I will point out two interesting features of Blooms that distinguish it from Go: the high prevalence of sacrifice plays, and the concept of the “Big Eye.”

Liberties

Blooms effectively solves the hex board’s high connectivity problem. Groups are often in danger of being captured, or simply are captured. The game’s four-colour nature allows your opponent to attack a group using both of her colours, while you can only extend your liberties with a single move of the attacked colour. Blooms at a high level of play (or what is currently the highest standard of play) has a lot of liberty fights and close races.

Cross-cuts

Blooms has something similar to cross-cuts, but with a twist. Though each triangle cell has at least two adjacent friendly stones when filled, these can be of different colours, creating two friendly groups that nonetheless block each other and reduce each other’s liberties. What would be a cross-cut in Keil can now be a meeting of four groups of different colours, as in Figure 2, below. But there is an imbalance in this situation: one player has his two friendly colours connected to each other. So, for example, if Red and Yellow are connected through a cross-cut, the loss of one of the group (e.g. Red) will allow for the other group (hence Yellow) to dive into the created void, as in Figure 3, below. But if the Blue or Black group is captured, Blue-Black cannot benefit in the same way.

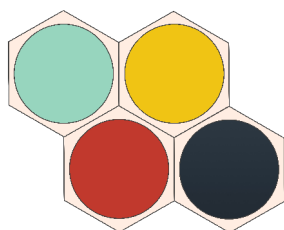


Figure 2: A Keil-type crosscut.

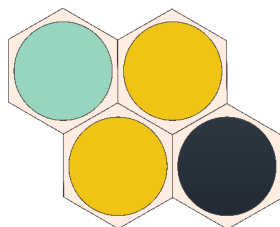


Figure 3: With the Red stone captured, a Yellow stone can jump in to connect.

Go concepts

A lot of Go concepts translate to Blooms. For example:

- Liberties and liberty races, as already mentioned.
- Blooms has the notion of eyes. A group surrounded by enemy stones must create three eyes to live.
- Blooms has a very interesting family of *seki*-like situations. Enemy groups can share a single eye of three liberties, they can each have a proper liberty and share an eye of two liberties (or two of one for that matter) or each have two proper eyes and a shared one. But this is not limited to groups of enemy stones. Sharing eyes also is a powerful way of giving life to several (usually two) groups of your own.

There are only three forms of high art: the symphony, the illustrated children’s book and the board game.

~ Brian K. Vaughan

Cyclical positions

Blooms lacks Go’s short repeating cycles (called *ko*). However, Blooms has longer cycles and the rules address them in an interesting way. There are two obvious ways to deal with long cycles: a super-*ko* rule, which forbids the same situation from happening twice, or allow the game to end in a draw. Blooms takes a third way: it sets a certain number of captures as the unique winning condition of the game. Interestingly, the game often ends in the board being shared as it would be in a normal game of Go. In this situation, instead of passing, players simply fill their territory until they are forced to give each other prisoners by playing in the opponent’s area. Note that at this stage, it is not profitable anymore to play two stones every turn, which is the reason for allowing players to play a single stone on their turn.

Blooms’ inventor claims this winning condition emulates area scoring with a group tax. That is roughly correct, but not always. It works under the assumption that both players have played the same number of stones, but there are situations when a player is forced to answer a threat from a single stone by playing two stones. Or someone might want to launch an attack by playing two stones several times, when the opponent responds with only one stone each time. These imbalances are not indicative of perfect play, but they show that in actual play, things might get a little bit trickier than counting areas.

I have personally seen only one cycle occur in one of my games. This cycle is depicted in Figures 4, 5, and 6.

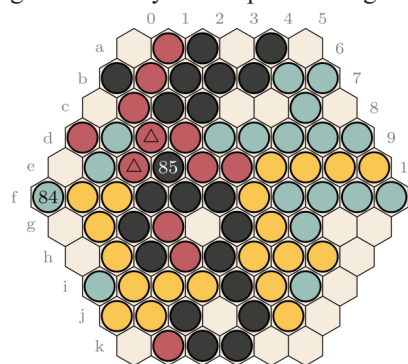


Figure 4: Desperis (RY) - Gulchen (UB).

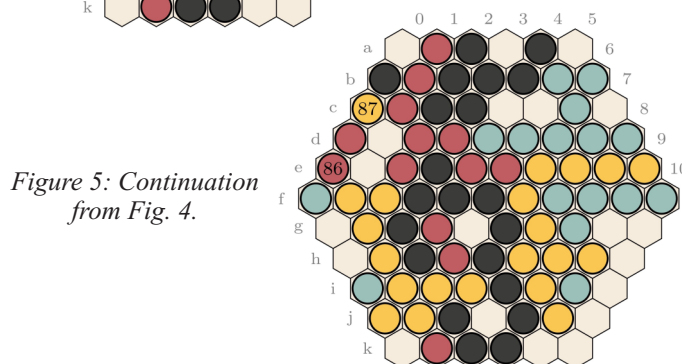


Figure 5: Continuation from Fig. 4.

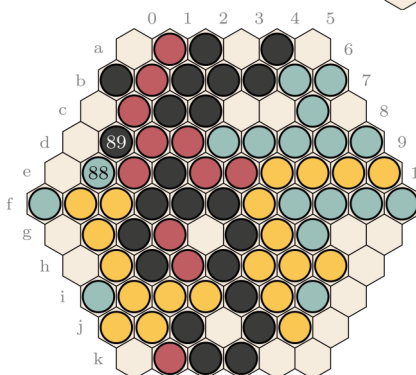


Figure 6: Continuation from Fig. 5.

Observe that the top red group in Figure 4 is in immediate threat of being captured, Red-Yellow has no other option throughout the cycle but to defend this group. Also observe that the Black bottom group has only three liberties and no way to escape. The sequence depicted in the diagram is thus forced for both players, since a capture of either group (Red or Black) would be a definite loss. The outcome of this cycle depends on the number of captures of both players. This game was played with a 30 limit. It is interesting to note that Red-Yellow can break the cycle at any time to capture the five blue stones on the right. Blue-Black, also, can use a move to capture the three Red stones on the bottom. This cycle hence comes down to whether Red-Yellow will cross the 25 prisoners line before Blue-Black crosses the 27 prisoners line.

Sacrifice play

A big aspect of Blooms is it allows for many sacrifice plays. And I mean a lot! Here is why: players are allowed to place stones on any empty cells, including cells that render one of their own groups surrounded. After placing the stones, a player removes any surrounded groups of enemy stones, but not her own. Stones which “committed suicide” this turn remain on the board until the end of the opponent’s turn. This allows for many beautiful strategies.

Figure 7 shows how it is possible to sacrifice stones to cut an opponent’s group. When playing **2** in this diagram Red-Yellow is sacrificing two stones which will be removed only before his next turn. If he commits to this strategy, he can follow it by (**Yf4, Rg5**) once again sacrificing a stone to maintain the cut. On his next turn, he plays (**?, Yg5**) for the finishing blow. Similarly, observe that Blue-Black cannot breach the yellow territory by capturing **a2**. Red-Yellow would simply replace the red captured stone by a yellow stone to seal his territory. Finally, for the same reason **b4** and **c0** are real eyes for the black group and yellow group, respectively.

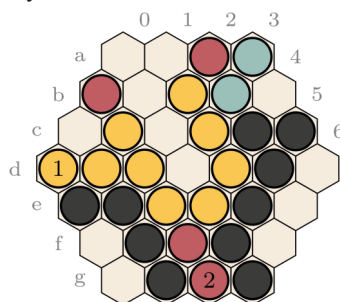


Figure 7: The black group is cut.

Figure 8 shows an extreme example of a sacrifice play. It is the Red-Yellow turn and, assuming he can sacrifice enough stones, he has a strategy to capture the left black stones. By playing **Ri6** at every turn while slowly filling the group’s outside liberties, Red-Yellow effectively prevents Blue-Black connecting to the right black group. In the discussion of the Big Eye, we will see Red-Yellow can fill the inside liberties of the black group without getting stuck in a loop. Figure 8 also shows an interesting example of a shared life between the right black and blue groups.

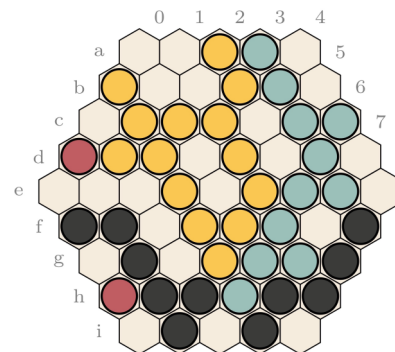


Figure 8: The left black group will be captured.

The Big Eye

Figure 9 and the succeeding figures show an interesting phenomenon that I like to call the “Big Eye.”

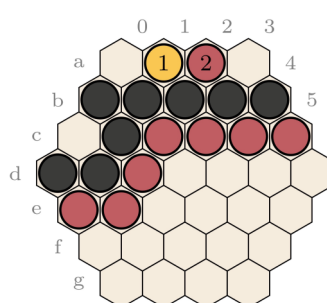


Figure 9: Black is alive with a Big Eye.

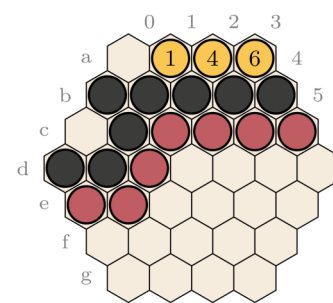


Figure 10: Continuation of Fig. 9.

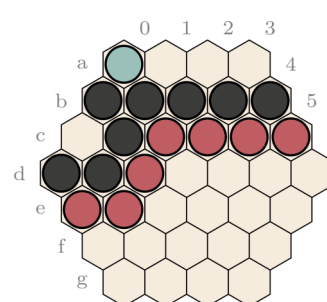


Figure 11: Continuation of Fig. 10.

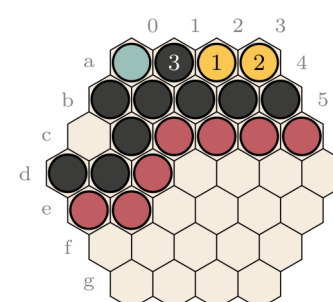


Figure 12: Continuation of Fig. 11.

Black already secured an eye at **c0** and has another made of a line of four cells. It is tempting for Red-Yellow to play as shown in Figure 9 to block black from making three eyes. Next, if Red-Yellow wants to attack the black group, he has to attack her liberties from the inside. First (**Ra3, pass**), sacrificing two red stones. Blue-Black does not need to answer, then (**pass, Ya2**), then (**pass, Ya3**) which leads to Figure 10. Now, if Blue-Black were to capture with a black stone, she would critically reduce her own liberties and the group would be doomed. I think this would be the first instinct of every Go player. The key play here is to capture with a blue stone as shown in Figure 11. Black is now threatening to play either **a1** or **a2** to form second and third eyes, but if Red-Yellow now plays both of these points, it simply reverts to Figure 9. If Red-Yellow plays a single stone at **a1**, he captures the blue stone and Blue-Black can freely take **a2**. The last possible strategy

for Red-Yellow is to play a single stone at **a2** and Blue-Black should refrain herself from playing **a1** as this would not remove the **a0** blue stone and Red-Yellow would simply capture everything on the next turn. Blue-Black simply passes and the only remaining play for Red-Yellow is **a3**, which does not work, as shown in Figure 12. This situation happens quite a lot in actual play and I like to think about it with the proverb, “A Big Eye is worth two eyes.”

There is much more to investigate about Blooms, which is a deep and interesting game. I recommend it as a colourful, workable, and deep Hexagonal Go. ■



Blooms is a game by Nick Bentley, who is one of the very active modern abstract game designers producing highly original new games. His first big hit was Catchup, which was implemented on Little Golem in 2010. Catchup has attracted a consistent following, with regular tournaments and a number of very strong players. Several other of Nick's games, including Circle of Life and its successor Bug have attracted much attention, and Circle of Life, as well as Blooms, is playable on BoardGameArena.

Thibault has admirably pointed out some key features of Blooms that demonstrate how interesting and original it is. To my mind the tactics around sacrificing stones are particularly deserving of attention, although I suspect there is much more that Thibault did not touch on at this time. The sacrifice tactics emerge from the rule that only opponent's dead groups are removed at the end of your turn, a rule which obviously is a brilliant design decision. It is wonderful when strategy and tactics unfold in this manner from seemingly unrelated rules.

One of the things I wondered about when I first learned of Blooms was its scalability. Go, for example, scales seamlessly from 9x9 up to 19x19, and beyond. The grand strategies of Go only become apparent in the larger sizes. The largest size of board on which Blooms is played regularly seems to be the base-6 board used, for example, on BoardGameArena, with 91 spaces. How would Blooms work on a base-10 or base-11 board, for example, taking it closer to the scale of a 19x19 Go board? I asked this question of Thibault, who answered as follows:

“The current available sizes on BoardGameArena, base 4, base 5, and base 6 already show that the size impacts the game play. While base 4 is really a toy model of the game, base 5 feels similar to playing Go on a 9x9 board. On a base-5 board, there is no place for more than one group of each colour. Usually, games which do not end by resignation or annihilation of one player's stones, will end in the board being split in exactly two areas between Red-Yellow and Blue-Black. This can often be one Red group and one Yellow group sharing life or simply one group of a single colour, all stones of the friendly colour having been wiped off of the board as cannon fodder. Base 6 already has a slower pace which feels closer to a 13x13 Go board. I would be very interested in playing Blooms on a base-9 board, with at least a 50 prisoners limit to see how the game scales up. Is local stability eventually achieved, in the sense that the game progresses from one local fight to another or do ‘all or nothing’ situations predominate? It is certainly a topic that needs to be explored. With a larger board, Blooms might very well see tactical and strategic emerging complexity comparable with that of Go or Hex, for example.”

References

- “Bug: perceptual binding, identity and meaning in a new sort of polyomino game”: <https://www.nickbentley.games/bug-polyomino-perceptual-binding/>
- Nick Bentley Games: <https://www.nickbentley.games>
- Blooms on BoardGameArena: <https://boardgamearena.com/gamepanel?game=blooms>

*Header image: Salt evaporation ponds formed by salt water impounded within levees in former tidelands on the shores of San Francisco Bay. Doc Searls from Santa Barbara, USA, CC BY 2.0 <<https://creativecommons.org/licenses/by/2.0>>, via Wikimedia Commons

Blooms' designer, Nick Bentley, added,

“I've kept the game limited to small sizes to start not because I think it's best on those sizes, but because everyone's a beginner and people learn best on small boards before scaling up. That seems especially important for Blooms, because of its many tactics, like the scope for sacrifice play mentioned in the article. In my experience, new players, even many players familiar with Go, often fail to see much of what's going on at a tactical level at first, and I want to figure out how to improve that situation. For experienced players, I believe the best version of the game will likely be on larger boards than are available now, but not as large as 19x19 Go. If I had to guess, I'd guess a board with somewhere around 200 to 250 cells will be best for competitive play. But that assumes the game will have local stabilities on the larger boards. My intuition suggests it will, but we'll see.”

Lastly, Nick made the following comment to further address Thibault's point in the article that Keil seems unnatural:

“In Keil, you can have two friendly stones that are visually connected, but which are functionally disconnected for the purpose of gameplay. This mismatch between visuals and game state is incredibly hard on the brain, which is designed to see regions of contiguous colour in the visual field as unified things (see my article on perceptual binding). So Keil forces you to ‘unlearn’ a basic, evolutionarily programmed assumption our brains automatically make. That's why it feels so weird. This demands a large amount of cognitive overhead, which will in turn make it hard for anyone to see deeply into the game.”

The perceptual issues in Keil are a good point, and perhaps Keil does require a new way of thinking. However, the approach of Keil can be thought of as natural to the hexagonal tessellation, as I pointed out after the Keil article in AG18. Simply put, the smallest connected unit in Keil is an equilateral triangle of adjacent stones, rather than the pair of stones of Go—a new slant on the concept of connectivity. I have to admit that Keil does require a game or two to get familiar with a few key shapes. Thereafter, Keil positions ought to be no more difficult to read than Go positions of corresponding complexity. I might add finally that Bloom's four colours versus two entails its own perceptual challenges, although again easy to get used to. Either way, Blooms offers an admirable counterpoint to Keil. Both games are highly original and successful solutions to the problems that emerge when trying to play Go on a hexagonal tessellation. Both games have interesting tactics that are not present in Go itself. ~ Ed.



Fenix

The best of Chess and Checkers

by Fred Horn

In October 2019 at the Essen Game Fair, HUCH! at last launched my game Fenix after three years of negotiation and testing. Three years seems to be a long time. However, at the same time as they took an option on Fenix in 2017, HUCH! licensed Kris Burm's GIPF series. The latter was prioritized, delaying the publication of Fenix. But for me the wait was really not that long. Fenix originated four decades ago when I was still young and at the dawn of my game-design career. I am really proud that this game at last reached the market in such a wonderful design.

The story of how this game was developed and why I think it is my best strategic abstract game will be explained in telling you its history. The game Fenix has existed, although under a different name, for over 45 years. I had it registered and copyrighted in July 1975 in the (now defunct) SEBA Foundation under the name Strike.

In 1974 I was administering accommodation at the University of Amsterdam. Over lunch, my colleagues used to play games. They played Chess or International Checkers, but the Chess players did not like to play Checkers, and vice versa the Checkers players did not want to play Chess. To cool tempers down, when at a certain moment they wanted to split up and go their separate ways, I said, "There is no need to quarrel! I will invent another game as interesting as both of these so we can all keep on playing together."

At that time, I had been thinking for a year about a game-mechanism for an abstract game in which captured higher-valued pieces could be reconstituted out of other pieces on the board. Of course, this was a nice idea, but to get from idea to reality within the boundaries of a game proved to be not so easy. What should be the size of the board? How many game pieces were needed? How could I make the game interesting and with an internal consistency? And above all, the game should be playable in the duration of lunchtime!

After much trial and error and a lot of playtesting with my game-loving friends the 9x9 squared board and 28 playing discs per player proved to be the best option for an interesting game.

I provided a few game sets for my colleagues. The boards were drawn on cardboard. For the pieces, I was lucky to find in the Waterlooplein (a famous flea-market in Amsterdam) some cheap boxes of *damstenen* (checkers). After I explained the rules and donated the sets, everybody adopted Strike enthusiastically, and from that moment on Strike was the only game played at the office during lunchtime. For some 20 years thereafter the game was stored in my files. I took out the prototype once in a while when interested players asked to play Strike on our game nights.

I could not have been more surprised when some 25 years later, in early 2000, I stumbled upon a former colleague from the University of Amsterdam. After we exchanged greetings, he jabbed

a finger at my chest and said, "Do you remember that game of yours, Strike? We're still playing it!" I was flabbergasted that the game was still being played in that same office after all this time. It certainly says something about the longevity and durability of the game!

Earlier, in the 1990's I was introduced to the famous game inventor Alex Randolph at a Board Games Studies (BGS) Colloquium. I had brought the game Strike along with me and showed it to Alex. He was interested in Strike and above all in the principle of reconstituting higher-valued pieces—which he thought was a real innovation. We exchanged addresses, and I sent him a prototype copy of Strike. In a return letter Alex suggested a different name. In his opinion, the game deserved a "better" name and his suggestion was Phoenix, after the mythological bird which rises again from its own ashes.

When HUCH! expressed interest in Strike, because of their plans to publish a series of abstract games, I immediately proposed Alex's suggestion, Phoenix, instead of the original name, as a way of honouring Alex. HUCH! agreed with the name-change, although they thought it was better written in a more "international" way: Fenix.

In addition, although HUCH!'s test panel found the game very interesting, they thought it was in some ways too complicated. They asked me to develop a "junior" or "simpler" version, which players could start with to learn the rules and some tactics before graduating to the "regular" game. They reduced the board to 8 x 7 squares and the number of pieces for a player to 21, for a less complicated and faster game. In tests the gameplay was definitely easier, but at the same time players had to use slightly different tactics. Both versions are included in the box of the published game.

Before HUCH! took an option on the game it was used in 2005 as a Christmas gift for the members of a volunteer organization, where I was the Chairman of the Board. One hundred cardboard game boxes with wooden game materials inside were manufactured by Gerhards Spiel & Design in their usual wonderful execution. Three of my games were playable with each of these sets, Strike, Fianco, and Renpaarden. The director of the firm, my friend Ludwig Gerhards, gave me a more luxurious game set with steel pieces as a "Thank you!" for the order. (See the image below.)



In the same year of 2005, the basic principles of Strike were used in a proposal by the small company Nova Carta (a company with which I was associated) for a series of games for the television company TALPA. On a board inspired by the TALPA logo, I had developed a simple version of Strike. In the end this venture was not to be, as everything was canceled by TALPA.

In any case, finally HUCH! has published Strike/Fenix, and now, 45 years after its conception the game is on the market in a really beautiful execution.



Original rules

Here now are the original rules of Fenix, as recorded by my game friend David Parlett. [*We have made minor edits and added diagrams. ~ Ed.*]

1. Strike is played on a board of 81 squares (9x9) with 56 pieces divided into two sets of 28 pieces of different colours, conventionally red and black.
2. At the start of each game the pieces are arranged as shown in Figure 1.

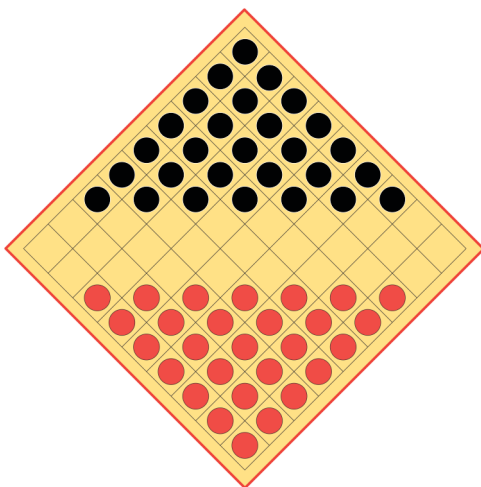


Figure 1: Starting position.

3. Red starts and the turn to play alternates. A piece once touched must be played.
4. Each player, on their first five turns, uses some of their own pieces to create one King and three Generals [*the latter alternatively called "Councillors" ~ Ed.*], in any preferred order. A General is made by placing any single piece on top of an orthogonally adjacent piece, and a King is made by placing any single piece on top of an orthogonally adjacent General. After the first five turns you will therefore possess: 1 King (a stack of three pieces); 3 Generals (stacks of two pieces each); and 19 Soldiers (singletons).
5. To continue, Red starts by moving a Soldier, a General, or his King.
 - Soldiers move orthogonally one step to an adjacent square.
 - Generals move any distance in a straight line orthogonally, like a Chess Rook.
 - The King moves one step to any adjacent square, like a Chess King.

These moves are subject to the rule that no piece may land on another, and a General can only pass over empty squares (in a non-capturing move).

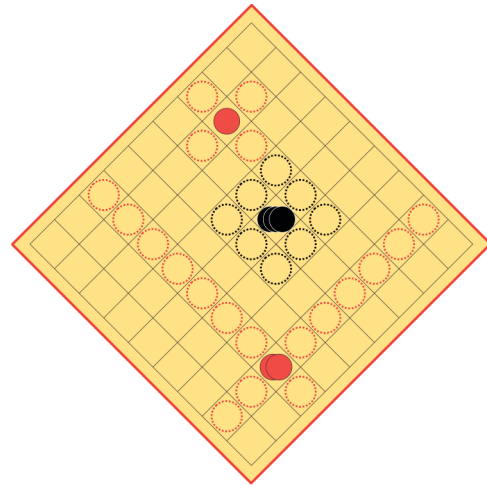


Figure 2: Moves of Soldier, General, and King.

6. Capture is compulsory if possible.
 - A Soldier or King captures by jumping over an enemy piece occupying a square to which it can legally move and landing on the square immediately beyond it in the same direction, provided that the landing square is vacant.
 - A General captures in the same way, but may move any number of vacant squares before the captured piece, and may land on any successive vacant square in line of travel beyond the captured piece.

If the capturing piece can then make another capture, it must, and it must continue doing so until all possible consecutive captures have been made. An enemy piece can only be jumped once in a single turn. If it is reached a second time it forms a block and ends the turn. At the end of a capturing turn all captured pieces must be removed from the board before the next player moves.

7. If more than one capture is possible you must choose that which captures the greatest number of pieces, counting a King as three, a General as two, and a Soldier as one. If two possible capturing moves offer an equal number of pieces, you may freely choose between them.

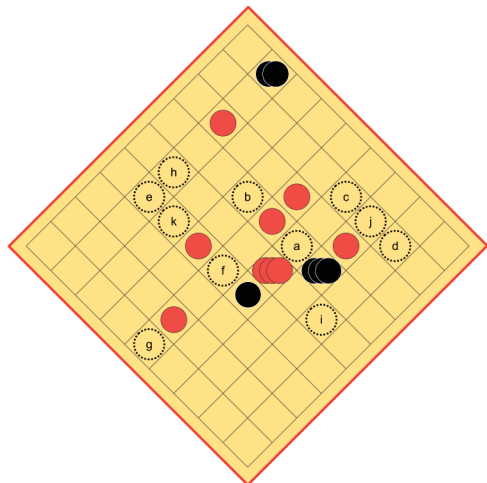


Figure 3: The black **S** can capture a **K** and **S** by jumping to **a** then **b**. The **S** cannot continue capturing to **c** because it does not move diagonally. The black **G** has a possible capture of three **S** by jumping to **e**, **f**, and **g**; however, alternatively the black **G** can capture an **S** and **K** by moving to **h** and **i**, say; the latter option must be taken, because it results in four pieces captured, rather than three, even though there are fewer jumps. The black **K** can capture a single **S** by jumping to **j**; however, it can also capture **K** and **S** by jumping to **f** and **k**; this latter option must be selected.

8. If one or more of your Generals is captured in one turn, you may use your next turn to create just one General (not more) from two orthogonally adjacent Soldiers anywhere on the board. However, you may not also move in the same turn. If you do move, instead of creating another General, then the right to create a General is lost.

9. If your King is captured you must, if possible, use your next turn to create another King by placing a Soldier on top of an orthogonally adjacent General. This counts as a turn, and it prevents you from creating another General if one or more was taken in the same turn as the King. *[To clarify, re-instantiating a General or King takes precedence over a capture; the capture would otherwise be compulsory. ~ Ed.]*

10. If you are unable to create another King, when your King is captured, you lose the game.

11. You also lose if you repeat the same sequence of moves for the third time.

12. If neither player can capture the other's King, the game is drawn.

Published rules

The published rules with the HUCH! set differ from the rules above. The word "adjacent" is missing when creation of the Generals and King at the start of the game is described. It makes for a slightly different game. In my discussion with the publisher, after receiving the printed games, we agreed that changing was no option, so I returned to my test-players and we tried Fenix in this new way.

The judgment was unanimous that you could start the game very well this way. However, it generated a different strategy in the opening phase of the game, if Soldiers are stacked that do not have to start orthogonally adjacent to each other. In the original game it is risky to use pieces from the "frontline" to make a General or a King. Now it is easy to take a piece from the frontline and use it in a crowd of Soldiers further back to make a General or King.

In the original rules, one of the key strategic factors of the first phase is the compulsory creation of empty squares within the players' starting formations. This is what I planned when inventing the game. With the new rule it is possible to create a tight-knit army without empty squares in its midst.

Note that the new rule has even more impact when playing with the smaller board, as we found out when test-playing.

I myself prefer the original way of making the Generals and King—I have no hard proof, but I think it the game is strategically more interesting if you are forced to create "holes" in your army. Nevertheless, I have to accept that people will tend to play the game according to the published rules. Readers of this article, and anyone else who knows Strike/Fenix can make their own choice.



Strategy

All comments on strategy concern the game on the larger 9x9 board with the original rules. As mentioned above, the smaller board was the publisher's initiative. I tested the small version many times with other game-buffs. Our opinion was that the game's strategy was not very different, except that attacking starts immediately and the game moves to the endgame much more quickly than on the larger board.

Although I invented Fenix, I am not a good player because, as is the case with most of my game playing, I play by intuition rather than analysis. Hopefully, nevertheless, I can tell you something of the strategic ideas in the game.

Opening

In the opening the players start to arrange their armies to provide a maximum of defence, while keeping some pieces positioned such that a quick attack is possible.

The two corners to either side are strong places to occupy with a Soldier. This creation of a tactically strong place for Soldiers can also happen at the edges of the board with two soldiers.

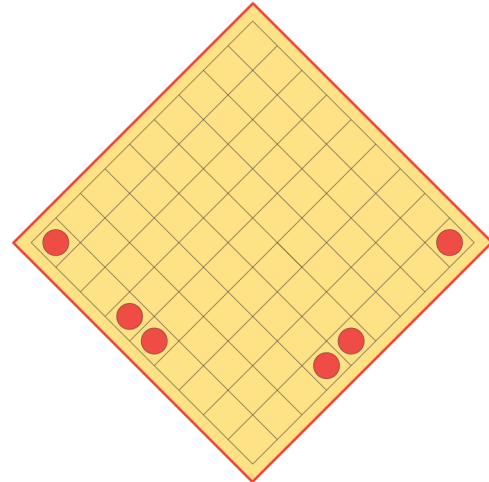


Figure 4: The red Soldiers in the corners and on the edges are invulnerable to capture.

However, to come into play and have room for manoeuvring, the Generals need open lines behind the army. Thus, the first and second rows of squares next to the edge of the board have a dual function: as defence lines to keep pieces invulnerable from capture, as well as creating space to get the Generals into play.

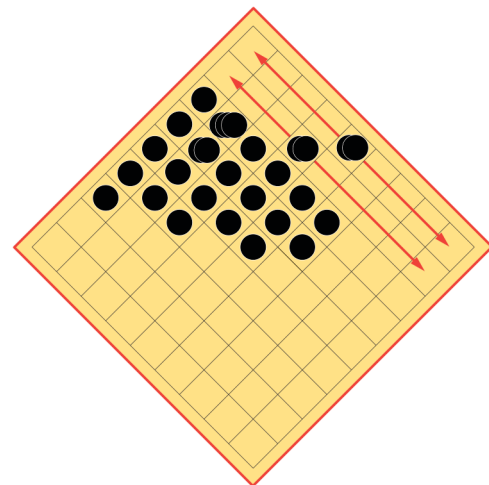


Figure 5: The black Generals can range freely.

Of course, holding your own corner occupied is an easy way for defending your territory. Most first time players use this square for positioning their King, but in reality, it makes your King (one of the strongest pieces on the board) nearly powerless.

Good defence asks for well-built fortifications. A square of four adjacent Soldiers on the board is a stronghold which is capable of responding well when the opponent begins an attack. Each Soldier in the square of four is invulnerable to capture by any

piece except the King. An extension of this fortress is a well built defence line!

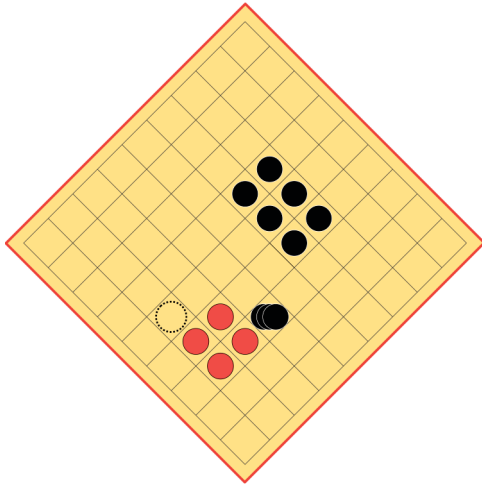


Figure 6: Strong formations in squares and rectangles, where only the corner pieces can be picked off, and only by the enemy King.

When positioning Generals behind these fortifications, plans can be made for attacking the opponent's forces. Note, however, that bringing all pieces towards the centre, away from the edges of the board, can allow for a quick destruction!

Middle game

In middle game, players try to attack the opponent's forces in such a way that for themselves, after capturing moves, a better territorial position is realized on the board. Because capture is compulsory, one of the real tactical features of this game is forcing the opponent to make one or more, captures that are to your advantage. By forcing the opponent to capture, you may be able to respond by capturing more Soldiers or even a General or King. Typically, you offer one of your own pieces to force the opponent into a position that is to your benefit rather than his. Be sure, however, to know which move is the compulsory capture of *most* pieces

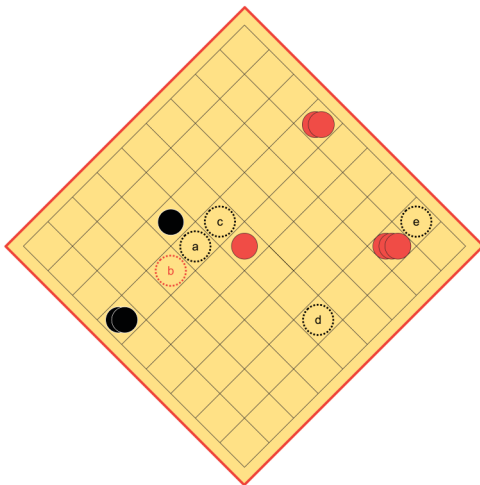


Figure 7: If Black moves the Soldier to *a*, Red's capture at *b*, say, is mandatory, permitting the series of Black captures, *c*, *d*, and *e*.

Capturing one more Generals in one capture move gives an advantage in addition to material, because the other player loses tempo. However, be careful, because capturing an opponent's General gives him the possibility to make a new General elsewhere in the next move. This is the really new feature of the game. When losing one or more Generals, the player is allowed to make *one* new General in the next move from two orthogonally adjacent Soldiers. It is comparable to "dropping" a previously captured piece in Shogi.

Note that it is not compulsory to create a new General when one is captured, and this might be a good plan if a nice multiple-capture is possible.

In middle game, the players try to spread their opponent's pieces over the board, which makes it much easier to use Generals for capture. Also, when there is more space on the board, the use of the King for captures can be the start of winning the game. The King may be able to approach Soldiers and Generals with impunity for diagonal captures.

When material is low, make sure you still have adjacent Soldiers in case you need to recreate a General. Likewise, always keep a General with an orthogonally adjacent Soldier for making a new King when you must sacrifice your own King.

Endgame

The endgame is a chase to capture the opposing King. There are many tactical considerations that are similar to those in other checkers-type games, but Fenix has a whole other set of tactics because of the manner in which Generals and the King are reconstituted after capture. I leave it to you to make your own discoveries. The author wishes you, "Good play with Fenix!" ■



Review of Fenix

by Kerry Handscomb

Originally, I had planned to write a simple review of Fenix, or Strike. However, Fred replied to my questions with such detail that we decided to make his responses the main item. Nevertheless, Fenix is a good game that deserves a review.

Fenix is most definitely a combination of Chess and Checkers, because it was precisely designed to appeal both to Chess players and Checkers players by combining elements of both games. Nevertheless, Fenix is not advertised as a combination of Chess and Checkers. It is its own game. Chess is present in the pieces of different powers, and also in its object, effectively to capture the opponent's King—in such a way, however, that a new King cannot be recreated in the defender's next turn. Checkers is present in the capturing rules, and in particular that capturing is compulsory, the source of so many tactical combinations in the checkers games.

Nevertheless, the manner of making Generals and Kings is original and brilliant. The creation and recreation of Generals and Kings by stacking lower-valued pieces has a GIPF-like feel to it. As Fred notes above, HUCH! prioritized republication of the GIPF games over Fenix. Nevertheless, Fenix does compare well in my estimation with the best of the GIPF series. As we can see from Fred's comments, Fenix has a number of interesting strategies that are within fairly easy reach for beginners, guaranteeing that it is a fun game for thoughtful players.

Several tactical and strategic considerations arise

immediately from the rules governing the re-instantiation of Generals and Kings, but are not explicit within these rules. I usually think this is the sign of a good design, where the simplicity of a rule belies its significance. For example, a King has to be created from a General, and when a King is created a General disappears. Since there can never be more than three Generals of a colour, the King can only be re-instantiated a maximum of three times, maybe less if a General has already been lost for other reasons. This very fact is a good argument for (almost) always to re-instantiate a General when you can, and (almost) always to keep a pair of orthogonally adjacent Soldiers so that the General *can* be re-instantiated.

For the opening, Fenix has somewhat of a Chess-like feel, where the armies are disposed for attack and defence and lines are opened for the power-pieces. Perhaps it might be better to have two Generals ranging on one side, as in Figure 5, or better to have one General ranging on one side and one General ranging on the other side—I do not think there is time in the opening before conflict to arrange the army so that all three Generals are able to range freely. These clear strategic options (as well as others, perhaps) are a really nice feature of Fenix.

Like Chess, too, the use of the King as a power-piece in the late middle game and the endgame is interesting. The King is the only piece with the ability to move diagonally, meaning that it can approach and threaten other pieces without necessarily being threatened itself. Many of the interactions between Soldiers and Generals, on the other hand, promise mutual destruction, depending on which side has the tempo. The march of the King on the attack, and its appropriate timing, is a good feature of Fenix.

Aside from these Chess-like aspects of Fenix, the power and beauty of checkers' combinations can be utilized. I am sure that many of the standard tricks and traps of the checkers games are easily portable to Fenix, although I am not well qualified to judge this matter. Many of these tricks and traps rely on compulsory capture. Compulsory capture is used, of course, to pull pieces out of position from the defensive formations. It is fun even for a checkers non-expert like myself to sacrifice a Soldier or two for a nice multiple capture. These kinds of manoeuvres are easily within reach for the casual but thoughtful player.

The disputed rule is whether the moves to create Generals and Kings at the beginning of the game need to be between orthogonally adjacent pieces or not. Fred himself prefers the original rule, that the pieces need to be adjacent and that holes in the players' armies will naturally arise. I prefer this rule, too, as I think it naturally provides for a greater variety of strategic options in the opening. This may appear to be paradoxical, because allowing non-adjacent moves means that many more sets of opening moves are possible. Like Fred, I have no clear proof that the original rule will lead to more varied games. However, perhaps the best reason for preferring the original rule is that it logically follows the rules of the rest of the game, where Soldiers can only move one space orthogonally. The "flying" pieces for the setup seem to be out of character with the rest of the game.

I prefer also the 9x9 board. The armies on the 7x8 board start very close, and there is no space for manoeuvring to choose a variety of opening setups—hostilities occur almost immediately.

Fenix may well be one of the very best of the games that combine elements of Chess and Checkers. Moreover, as I mentioned, Fenix is definitely its own game, and brings something completely new to the table. Of the many games we have been playing, Fenix is one of those rare games that we keep bringing back. We know Fenix will be a fun playing experience by offering a variety of nice tactical and strategic options.

Aside from my own strong recommendation for Fenix, Fred's story of its adoption and longevity in the administrative offices of the University of Amsterdam is a recommendation in itself that is difficult to top. I wonder if they are still playing Fenix there (calling it "Strike"), and whether succeeding "generations" of office staff are passing it down through the decades?

You can buy HUCH!'s set, which is beautiful. As a bonus, the smaller board is perfect for the game *Murus Gallicus*, and could almost have been designed for *Murus Gallicus*. Otherwise, all you need is a 9x9 board and some discs. ■

(Schada, continued from page 15.)

There are several other possible end-conditions for the game. As with games like *Halma* (see *AG15* and *AG18*), pieces may get blocked and not be able to make further progress towards their goal. The game ends if a player has no high pieces outside the goal line that can move, because their movement is blocked. The original rules are vague on this point. However, my interpretation is that the blocking pieces have to be enemy pieces. Friendly pieces blocking a high piece do not trigger the end of the game. The rules state also that the game ends, by repetition, when the identical board position occurs three times. Lastly, if both players in consecutive turns shuffle high pieces back and forth within their base line or goal line, the game ends.

When the game ends, the players score to see who has won. A Field Officer in the goal line is worth 2 points; an Officer in the goal line is worth 1 point. The player with the higher score wins. Obviously, you do not want to end the game immediately if you have a lower score than your opponent!

If the scores of high pieces in the goal lines is tied, the player with the highest score of high pieces outside his goal line wins (Field Officers, 2; Officers, 1). In a normal game end, only one person, of course, will have high pieces outside his goal line, and this person will win. However, in the case of a game ended because of repetition, for example, both players may have high pieces outside their goal line.

If the players are still tied, calculate the values of all the high pieces outside their respective goal lines for each player in the following manner. Each row further from the base line counts 2/7 for the Field Officers and 1/7 for the Officers. If even this calculation is equal, the game is genuinely tied.

The rules to decide otherwise drawn games are complex, but I suspect that they are rarely needed. The designer of the game is rewarding firstly accomplishment of the objective of getting high pieces into the goal line, and secondarily the winning of "territory" by moving pieces at least *towards* the goal line.

Acknowledgements

- The 1939 rule booklet that was the basis for the description of Schada was sourced from the Koninklijke Bibliotheek in Den Haag (The Royal Library in The Hague).
- An earlier version of the investigation by Fred Horn was published in the quarterly magazine of the AGPI (Association for Games & Puzzles International), formerly known as the AGPC (Association of Games & Puzzle Collectors), in AGPC V.18 No. 2, Summer 2016. The updated version here is published with permission.
- The article for the AGPI quarterly magazine was the subject for a presentation for the Board Game Studies symposium at Spiele-Archiv Nuremberg on April 13-16, 2016.



Murus Gallicus

A game of balance, space, and timing

by Phil Leduc

In 52 BCE, at the conclusion of the Gallic Wars, Julius Caesar besieged the ancient city of Alesia. The Gauls had built a walled city-fort to keep the Romans out, and the Romans built walls around the city to keep the Gauls in!

Murus Gallicus is a breakthrough game of balance in material and tactics, area control, and timing. Pieces are sown and captured by mutual elimination. It is a game of straightforward strategies and subtle tactics that tests the inner General. Players attempt to force their opponent to yield the center of the board and press forward for a breakthrough win. Failing this as material dwindles, stalemate becomes a feasible path to a win.

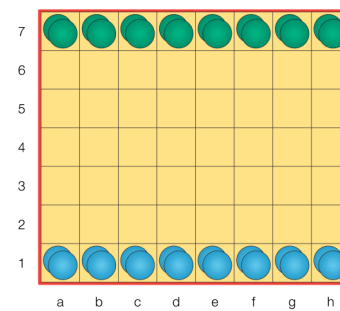
Murus Gallicus was designed starting in 2005 and finally published in 2009. Its design was based on the principles of accessibility, simplicity, and balance. The game was to be easily constructed from game components available to all; it was designed on a coffee table using a checker/draughts board and an ample supply of checkers. It was not intended to be a commercial success; rather it was hoped (perhaps naively) that it would be played based on its own merits. Time will tell. The rules were to be kept to a minimum in order to entice new players and, of course, the rules were to veil tactical complexities for the serious gamers too. Lastly, the game was to keep players engaged from start to finish. The game was to be balanced and tense so that each player always felt they had a chance to win.

The original goal of the game was to tie up or wall off the opponent's pieces and was initially named Houdini (after the great Hungarian-born American illusionist and escape artist, Harry "Handcuff" Houdini of the early 1900's). Movement was as in Mancala, only in two dimensions instead of circular. Stacking limits were fuzzy. Play testing revealed the game was too slow and sluggish. Large stacks did not distribute well, but that was acceptable since this contributed to the stalemate goal. However, the game did need to be more dynamic. Capture by replacement was introduced causing the game to feel more like Checkers or Chess, with attrition the predominant path to victory. One problem with this was the distribution of multiple pieces and multiple captures; balance was in jeopardy. The stacking limit was dropped to just two. The goal of the game transitioned from stalemate to breakthrough or stalemate. However, it needed something more, something unique or rare to help the game stand out. With time, replacement capture morphed into mutual capture—to capture an opponent's piece, an own piece must be sacrificed. This fit well with the goal of balancing the game. Both players always have the same number of pieces on the board—material balance. With this change, the game seemed to work well. The rules were complete but the game needed a better name. Murus Gallicus (Latin for Gallic Wall) came about serendipitously from a series of internet searches. This new name had the added benefit of suggesting a

theme for the game. The theme would help players understand the game, playing the game would become more intuitive. Terms associated with forts and castles, such as *wall*, *tower*, *chariot*, *battering ram*, and *siege tower* apply well to the basic formations.

Setup

Murus Gallicus is played on a 7 x 8 rectangular board, seven rows (ranks) and eight columns (files). Each player starts with 16 stackable pieces and places stacks of two on each home row. The light player [Blue, here, and dark player, Green] leads, players alternate turns, no passing.



Initial setup

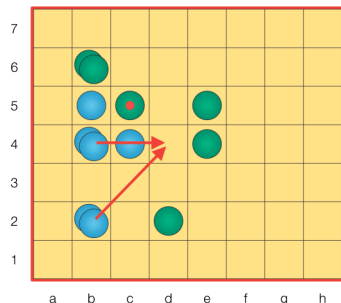
Rules

On a player's turn, the active player must perform one of the following two actions:

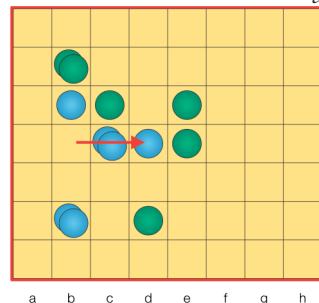
- Distribute a stack of two owned pieces onto the two nearest squares in any one orthogonal or diagonal direction. Each destination square must be empty or contain a single owned piece (singleton). This implies that distribution is blocked by the edge of the game board, the presence of an opponent piece, or *any* stack, including owned stacks! Note that the distribution onto owned singletons creates new stacks. Stack size is limited to two. Stacks never consist of opposing pieces.
- Sacrifice a piece from an owned stack to remove any one orthogonally or diagonally adjacent opponent singleton from the board. Sacrifice cannot be used to reduce opponent stacks to singletons. Sacrifice is not forced by the mere presence of an opponent's singleton.

If at the *start* of a turn, a player cannot perform either action, the player is *stalemated*. A player wins by

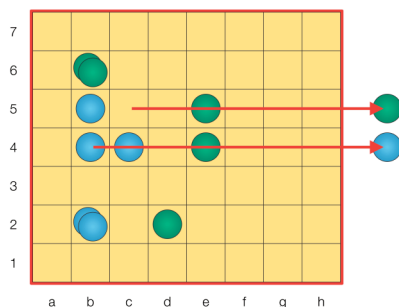
- Breakthrough, distributing a piece in the opponent's home row, or
- Stalemate, leaving the opponent with no moves or sacrifices.



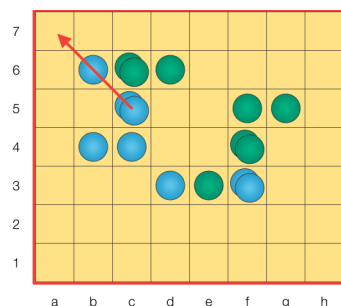
Blue's possible moves are indicated by arrows and a potential capture is indicated by a dot (c5). All other moves are blocked by the edge of the board, a Green unit, or a Blue stack.



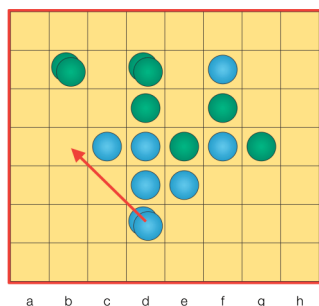
Movement result after the two Blue pieces in b4 are distributed to c4 and d4, annotated as b4-d4.



Sacrifice result after a Blue piece is removed from b4 and a Green piece is removed from c5, annotated as b4xc5.



Blue wins by breakthrough to a7. If Green to move, the capture c6xb6 does not prevent c5-a7.



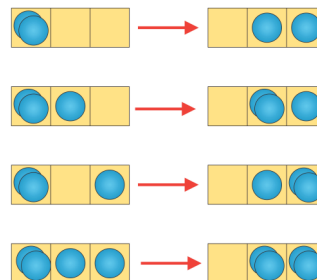
Blue stalemates Green with d2-b4. Green can no longer move to b4. Although Blue flattens her last stack, Green loses because he is unable to move or capture at the start of his turn.

Formations

The first observation that new players make is that controlling the movement of their pieces requires planning. Movement cannot be easily reversed. Each turn requires the distribution or sacrifice of a stack and yet having no stacks loses the game! This is a bit of a dilemma. The solution is to maintain stack count by distributing a stack's pieces onto previously placed singletons. The point being a player's singletons and stacks must coordinate with each other, as is the case in any good dynamic abstract game. These units can combine into various formations that block the opponent's movement, acting like walls and towers, charging across the board like chariots, or hammering through defences like battering rams.

There are four basic transformations that can occur when a stack is distributed. The stack distributes onto:

- Two empty squares—creating two new singletons
- One owned singleton then one empty square—creating a new stack and a singleton
- One empty square then one owned singleton—creating a singleton and a new stack, or
- Two singletons—creating two new stacks.

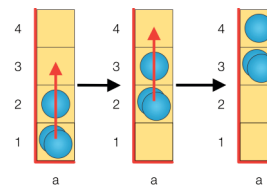


Stack distributions: Keep in mind stacks can distribute in any orthogonal or diagonal direction.

In the first case, a player's stack count goes down by one. In the second and third cases, the stack count is stable. Lastly, in the fourth case, the stack count goes up by one! In Murus Gallicus material for both players remains the same, but stack counts do not! Stack count is a good indicator of who is ahead in a game, but it is only part of the story; stack mobility and coordination with other units should also be considered.

Chariot Formation

The chariot formation consists of a stack and a friendly singleton in line with an empty square. By distributing the stack in the direction of the singleton piece, the formation advances one square. A chariot formation is ideal for "moving" stacks and can be used to create threats. This is akin to gliders in John Conway's Game of Life.

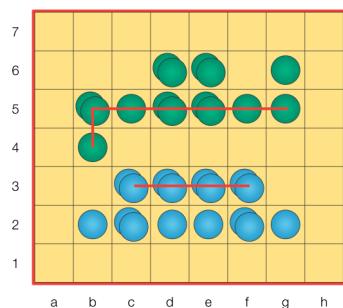


Unimpeded chariot movement.

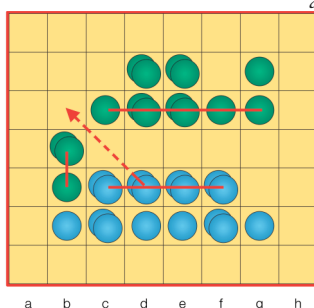
Gallic Wall Formation

A singleton acts as an obstruction to opponent stack distributions and as a stepping stone. Its main function is defence; but it is also a passive part of the offense too, since singletons are needed as stepping stones to move stacks. An isolated singleton with no adjacent friendly units is weak. It cannot move, can be easily sidestepped, and is subject to capture if neighbouring an opponent stack. Fortunately, there is strength in numbers.

A Gallic Wall formation is an orthogonally connected group of like-coloured singletons and/or stacks that form a barrier which impedes the forward progress of the opponent. The opening of a game of Murus Gallicus is often marked by the creation of barriers in each player's third row. The game board's short dimension (seven rows) encourages players to build walls in close proximity of each other and creates tension right from the start of the game.



Strong Gallic Wall Formations.

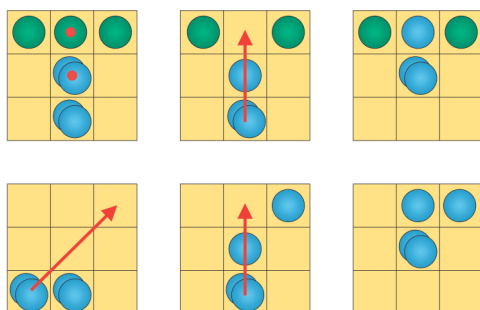


Weakened Gallic Wall Formation.

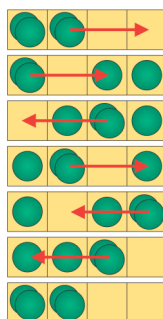
In the Strong Gallic Wall Formation diagram, the Blue and Green stacks have very limited forward moves available. Note that diagonal connections do not work well. In the Weakened Gallic Wall Formation diagram, Blue can slip through the two diagonally adjacent Green pieces, b4 and c5, with the move d3-b5.

Battering Ram Formation

A versatile formation is the battering ram formation, which consists of two adjacent stacks. Battering rams can be used to breakthrough singleton blockers. By sacrificing a stack piece, the player can create a chariot formation with an option to move onward next turn. In general, any two adjacent stacks can be converted into a chariot formation using any convenient adjacent opponent singleton piece. Even without the help of an opponent singleton, the stacks of a battering ram formation can, in two moves, convert into a bi-directional chariot formation.



Top row: Battering Ram Breakthrough; Bottom row: Battering Ram to Bi-directional Chariot Transformation.



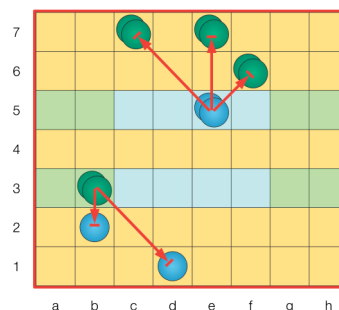
Battering Ram Cycle.

Two adjacent stacks can also be used to stall for time when an opponent is about to run out of moves. There is a cycle of six moves by which a battering ram with ample room can disassemble then reassemble to its original position. It is theoretically possible for both players to have battering ram formations, and this could

cause infinite cycling, but this is very unlikely. Both players would have to play for the draw and not interfere with each other. On much larger boards, it becomes more likely this situation could occur.

Siege Tower

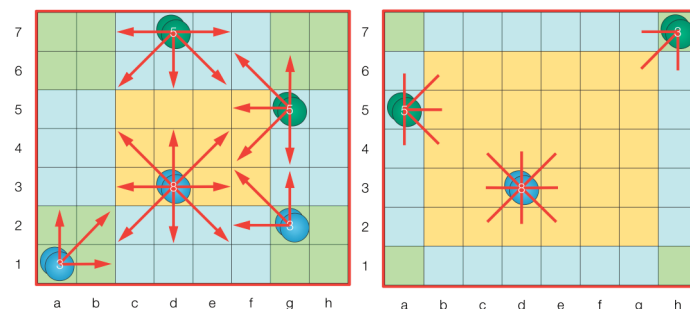
The primary goal of Murus Gallicus is to reach the opponent's home row, your seventh row. Doing this immediately wins the game. The penultimate goal is constructing a stack on your fifth row. Doing so puts a heavy burden on the defence because this stack must be stopped. The defender will have to dedicate two or three units (singletons and/or stacks) to block the invading stack, effectively reducing the defender's mobility. These burdened units are pinned—see the green stack on the third row and the blue stack on the fifth row, in the diagram below. Note that an intrusive siege stack cannot be directly eliminated from its perch and can sit there indefinitely—although the requirement to move or capture each turn may eventually force the siege stack to retreat. For these reasons and to underscore their importance, stacks on the fifth row are referred to as *siege towers*. Most of the action in Murus Gallicus revolves around obtaining a siege tower. Even the mere threat of achieving a siege tower is enough to force an opponent to sacrifice capture, which lowers his stack count.



Siege Tower Rows.

Strategy and Tactics

In general, because material balance is maintained through sacrificial captures, players must gain positional advantage to win; one that limits your opponent's options and expands your own. There is a battle for space. These options are best measured by efficient singleton structure and stack mobility. This is the key to any strategy. Each singleton's usefulness can be measured by how many opponent stacks it blocks, how immune to capture it is, and how many owned stacks can use it as a stepping stone. Any singleton that does not block and does not act as a stepping stone can be thought of as useless or isolated at least on a temporary basis. Stack mobility can be measured by how many directions it can use for distributing itself and how many opponent singletons it can capture. To these ends, it is best to build stacks in the centre.



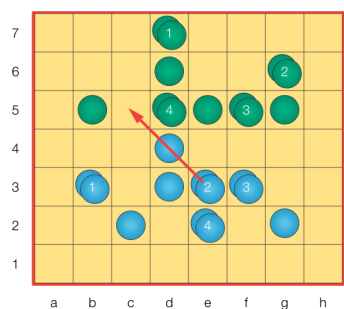
Mobility Potential.

Sacrifice Potential.

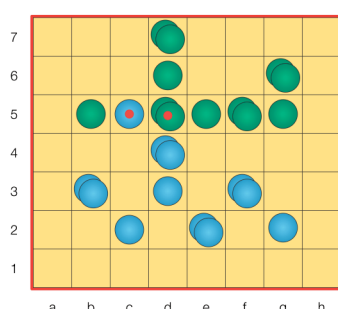
A straightforward strategy for playing Murus Gallicus has the following objectives: control the center of the board, breach the opponent's barrier, establish a stack on the opponent's third row (your fifth row), diminish the opponent's stack count, and then when the time is right go for the breakthrough or stalemate win. This seems simple enough, but at the same time, stack mobility must be maintained. Variations on this basic strategy include:

- Racing into the opponent's territory early in the game—foregoing development, in order to disrupt and unsettle the opponent. Against a knowledgeable player, this strategy may not work too well because early in the game blocking is relatively easy to do.
- Building a dominant formation in the centre—such as four stacks in a square 2x2 formation on the second and third rows, in the hope of using the flexibility that the battering ram formation offers.
- Constructing a wall of stacks on the third row—in order to block the opponent's forward movement. With these stacks assigned to a blocking role their movement is limited to opportune moments in the game. Waiting for these moments can be a challenge. A battering ram behind the leading wall can be used to stall.
- Aligning a wall of singletons on the third row with stacks on the second and first rows. This is a flexible defensive strategy, but gives up ground in the centre.

A common tactic to gain an advantage in stack count is to force your opponent to sacrifice a stack piece. This can be done by moving a chariot formation next to the targeted stack and creating a threat of passing through the opponent's defences. (See diagrams, Forced Sacrifice 1, 2, and 3.) If the opponent captures the chariot's leading singleton piece, the opponent's count declines, while the moving player's count does not! It should be noted that there is no stack count advantage gained if two singletons are created when approaching the opponent's stack; but this latter manoeuvre is useful in the end game, as it can block off the targeted stack in two directions and lead to stalemate.

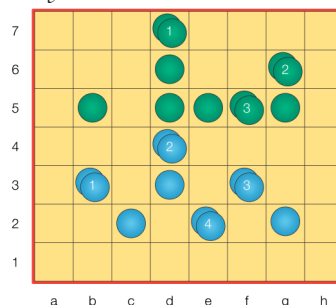


Forced Sacrifice 1: Both players have four stacks. Blue to move e3-c5.

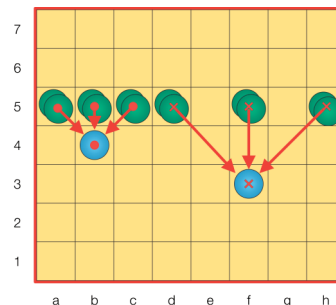


Forced Sacrifice 2: Blue threatens to create a siege tower at c5 with d4-b6.

Players should try to maintain stack count equality or superiority, but not at the cost of actual (rather than potential) mobility. The sacrifice action was designed to remove blocking singleton pieces. Therefore, when attempting to block opponent stacks with singleton pieces, it is prudent to distribute pieces two squares away from the targeted stack, as this denies immediate removal by the targeted stack.



Forced Sacrifice 3: d5xc5, Green has 3 stacks and Blue has 4.



Singleton Placement: Both Blue singletons block three stacks. On the left, the singleton is threatened by capture.

One last tactical consideration applies to the end game. Much of a game of Murus Gallicus has to do with the struggle to get a siege tower on your opponent's third row. If successful, the tower will very likely lead to a breakthrough win, but blocking and capturing makes doing so a challenge. If neither player succeeds in creating a siege tower, captures slowly reduce the material on the board, the end game becomes inevitable, and stalemate more likely. A player down to his last stack can no longer sacrifice capture or flatten out into two singletons! Be prepared.

Scalability

As stated earlier, the peculiar dimensions of the Murus Gallicus game board, 7 x 8, were selected to create immediate tension in the centre, and coincidentally the early wall formations materialize on the opponent's siege row! Murus Gallicus, as designed, is felt to be optimal.

That said, the game mechanics work well on 7 x 7, 8 x 8 and probably 9 x 9 game boards. A shorter game of Murus Gallicus can be played on a checker board with just six stacks to a side. Anyone with a set of checkers can try the game. It is believed that Murus Gallicus can be played on a 9 x 9 board with nine stacks per player or even larger, but this has not been play tested. Standard Murus Gallicus plays in about 10 to 20 minutes. Expect larger boards to require more time. One last thing about larger boards—with more space drawn games are more likely, as players can more easily create battering ram cycles. A four-player version can be played on an 8 x 8 board with six stacks to a side. Murus Gallicus has even been played on 5 x 5 hex-hex boards, which can be used for two or three players using nine or five stacks per player, respectively. Most of these configurations have been implemented in Stephen Tavener's game anthology program, AiAi, which is available free. Kudos goes to Stephen for his efforts. [See page 4.]

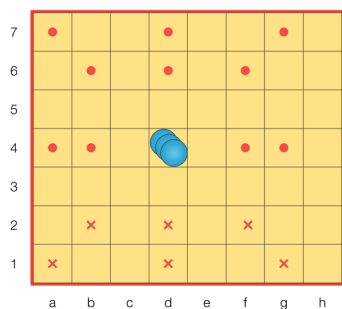
Variants

There are two variants with slight rule changes that readers may find of interest, Houdini and Advanced Murus Gallicus.

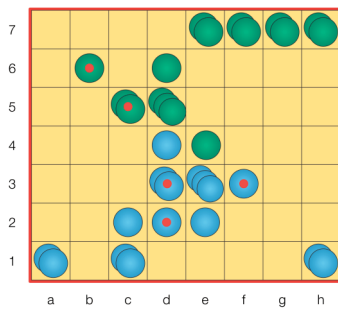
Houdini (escape version) was the predecessor of Murus Gallicus. The only rule change is that it is played without captures. With this omission, Houdini takes longer to play and encourages a divide-and-conquer strategy. Houdini may not be everyone's cup of tea but some may find it quite challenging.

Second, a more viable variant is Advanced Murus Gallicus, which introduces a new unit and a little more depth to the game at the cost of less elegant rules. The stacking limit is

increased to three like-colored pieces. Units of this height (referred to as a 3-stack) act like catapults. Instead of distributing its pieces, one of its pieces is “thrown” two or three spaces, in any forward or lateral direction, (left, diagonally left, straight ahead, diagonally right, or right) over any intervening units and must land on an empty square or an opponent’s unit (singleton, 2-stack, or 3-stack), but not owned units. When an opponent’s unit is hit, the projectile is removed from the game as is one of the targeted unit’s pieces. The remaining 2-stack can distribute as normal on a later turn. In addition, 3-stacks can be reduced by one or two pieces by adjacent opponent 2-stacks. The attacking stack loses the same material as the targeted catapult.



Catapult Range: Only the dotted squares can be targeted by the 3-stack. The squares with X's and all blank squares cannot be targeted.



Catapult Targets: The units identified by red dots can be “hit” by the opponent’s 3-stack.

Annotated Game

Murus Gallicus is a game of surprises. Knowledge of its rules and formations only suggests what playing the game might be like. The material balance provides tension for the duration of the game. Winning space in the centre of the board is no easy task, and gains can be squandered if careless. Threats abound and escapes are almost miraculous (shades of Houdini) until time runs out as pieces dwindle. Below is an annotated game that will hopefully give the reader a better sense of the game play. Enjoy!

1. a1-c3 d7-d5, 2. h1-f3 b7-d5 (Diagram 1). Blue’s first two moves, a1-c3 and h1-f3, develop her flank stacks towards the centre of the board. With d7-d5 and b7-d5, Green establishes a stack in the centre with an eye to d3 and b3. Blue’s loss of d3 would limit the development of three Blue stacks (b1, d1, and f1); whereas losing b3, which is off-centre, would only hamper two stacks (b1 and d1). Blue will have to respond to the d3 threat.

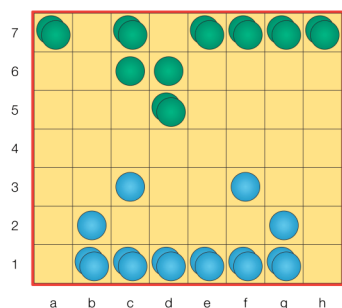


Diagram 1: Position after 1...a1-c3 d7-d5, 2...h1-f3 b7-d5.

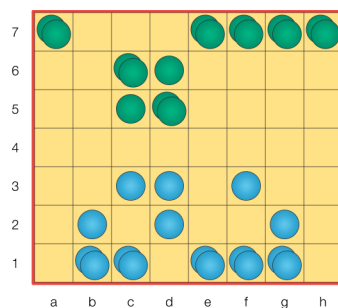


Diagram 2: Position after 3...c7-c5.

3. d1-d3 (Blue blocks by occupying d3 and believes b3 is less of a problem.) **3...c7-c5** (Diagram 2). Green uses a chariot move to approach the centre and prepares for a7-c5 or c6-c4, or ... ? **4. e1-e3** (Blue continues centre development.) **4...d5-b3** (Diagram 3).

Green gets aggressive and occupies b3, establishing a base for a siege tower—with perhaps c6-c4 and c4-a2 to finish the job later!

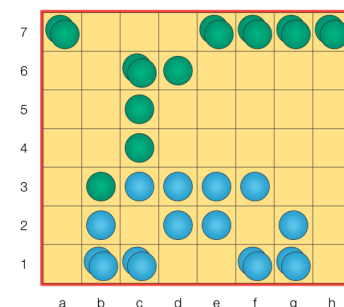


Diagram 3: Position after 4...d5-b3.

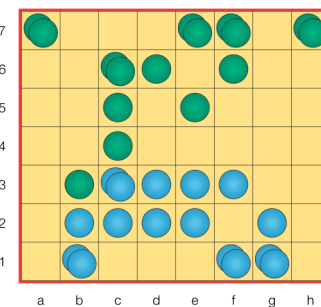


Diagram 4: Position after 5...g7-e5.

Blue had two options to defend: c1-a3 and c1-c3. 5. c1-a3 would create a battering ram formation that could be used to remove b3 and then the resulting chariot could move forward later—but this is off-centre. Instead, c1-c3 counter-attacks and targets e5. Turn-around is fair play. Blue can use c3xb3 later, but this will leave a singleton facing a battering ram!? **5. c1-c3** (Blue’s chosen move brings up a defender to capture the Green singleton on b3. **5...g7-e5** (Diagram 4). Green prevents c3-e5, which would jam up Green’s development, by occupying e5 first. Also, the two singletons on b2 and c2 will stop a siege tower on b3. Timing is not quite right for Green to head for the siege tower. **6. f1-d3** (Blue develops another stack in the centre.) **6...f7-d5** (Diagram 5). Green defends against d3-d5).

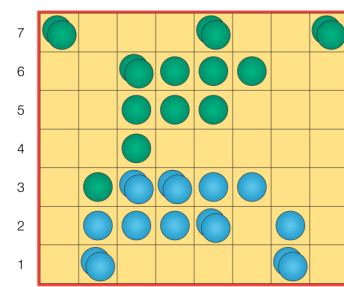


Diagram 5: Position after 6...f7-d5.

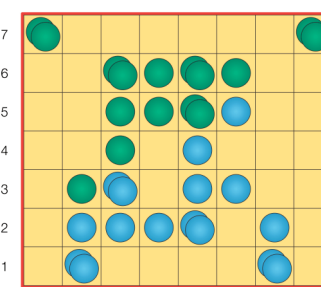


Diagram 6: Position after 7...e7-e5.

7. d3-f5 (Blue dashes to the siege row with thoughts of e2-g4 and f3-f5. A siege tower on f5 would require three blockers for Green to prevent a breakthrough win for Blue!) **7...e7-e5** (Diagram 6). Green brings up defenders and creates a battering ram formation.) **8. e2-e4** (Blue builds a centred battering ram formation and threatens e4-g6 to gain a siege tower on f5.) **8...e5xf5** (Diagram 7). Green is forced to capture f5.) Note that Blue has 5 stacks to Green’s 4 and Blue’s stacks are looming over the centre. Green must get some counter play, and he has the problem of two stacks in the corners.

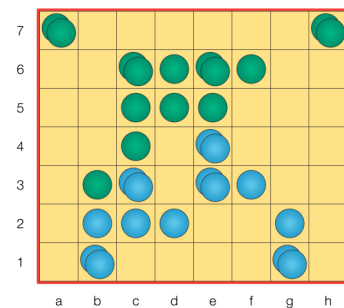


Diagram 7: Position after 8...e5xf5.

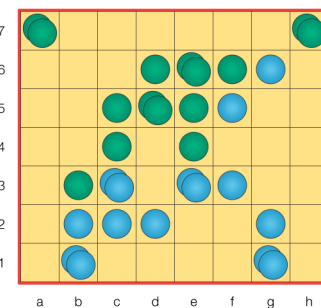


Diagram 8: Position after 9...c6-d4!!

9. e4-g6!? (Again, Blue positions a base for a siege tower at f5. Green's only defender is the stack on e6, and the stack at h7 is hemmed in. It can only sacrifice or flatten out. Unfortunately, this move leaves e4 open.) **9....c6-e4!!** (Diagram 8. Green plays to the centre and threatens a battering ram on b3 and c4 and another on e4 and e5!) **10. e3-g3??** (Blue hopes to counter with a siege tower on f5. She cannot defend against both battering rams.) **10....e6-e4** (Diagram 9. Green forges straight ahead.

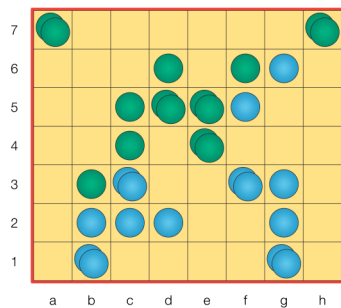


Diagram 9: Position after 10....e6-e4.

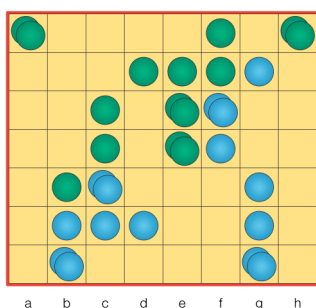


Diagram 10: Position after 11....d5-f7.

11. f3-f5 (Blue gets her siege tower, but it will prove to be ineffectual. f3-d3 would have offered a slightly better defence for what is to come.) **11....d5-f7** (Diagram 10. Green must block Blue's siege tower's breakthrough. This move also frees up Green's battering ram. Green can occupy e3 with e4-e2 and follow up with e5-e3 for a siege tower on e3.) **12. g1-e3** (Blue attempts to forestall the battering ram.) **12....e4xe3** (Diagram 11. The battering ram captures and transforms into a chariot formation. Pressure on e3 is maintained.)

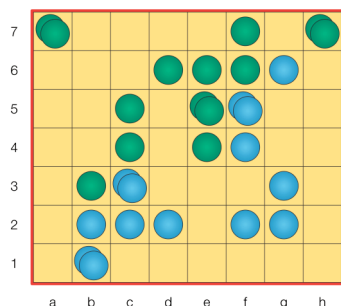


Diagram 11: Position after 12....e4xe3.

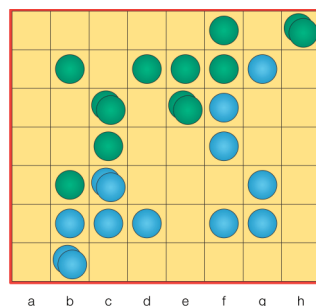


Diagram 12: Position after 13....a7-c5.

13. f5xe4 (Blue's siege tower is abandoned and is used to remove the chariot's leading singleton.) **13....a7-c5** (Diagram 12. From the distant corner, Green continues pressure on e3!) **14. c3-e3** (Blue blocks e3 again but unfortunately opens c3 and in doing so reduces her stack count to one. Her next move will be forced as she is down to only one stack!) **14....e5-c3** (Diagram 13. Green takes advantage of the opening and sets up for yet another battering ram.

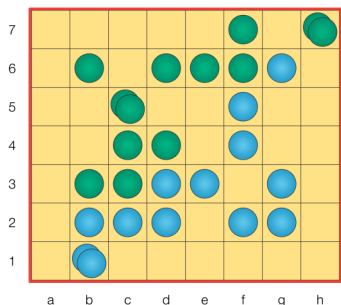


Diagram 13: Position after 14....e5-c3.

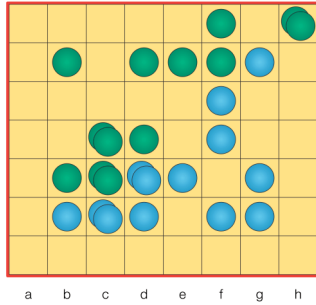


Diagram 14: Position after 15....c5-c3.

15. b1-d3 (Blue's only option. She creates a battering ram formation of little use.) **15....c5-c3** (Diagram 14. Green does the same; he creates a siege tower at the same time and pins Blue's stack on c2. Green wins in three moves.) **16. d3-f5** (Blue weakly responds by creating a siege tower on f5. It's blocked and impotent. d3-f3 and d3-d1 are no better and offer no help on the left flank.) **16....c4-a2** (Diagram 15. Green exerts even more pressure by creating a second siege tower.)

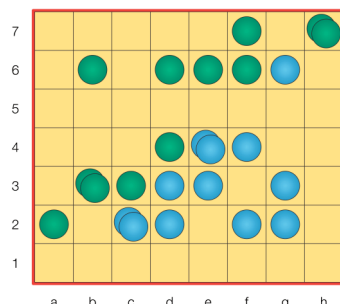


Diagram 13: Position after 14....e5-c3.

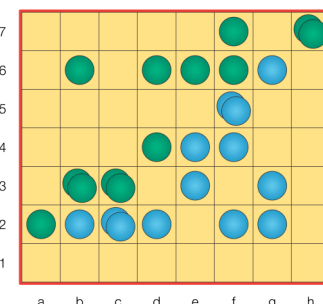


Diagram 14: Position after 15....c5-c3.

17. f5-d3 (Any move of the stack on f5 leads to the same result.) **17....c3xb2** (Black opens a path to b1.) **18. Resign.** (Diagram 16. Blue resigns; there is no way to stop b3-b1.) ■

There is a free downloadable Murus Gallicus Flash/Shockwave game file (Murus58.swf), whose AI function uses piece location, stack mobility counts, and the existence of siege stacks to select its moves! The game file is available for download here: <https://sites.google.com/site/theowlsnest02/home/murus-gallicus>

Murus Gallicus is also available for play on PC's using Stephen Tavener's Java-based game anthology program named AiAi, which can be downloaded for free from his website: <http://mrraow.com/index.php/ai-ai-home/>

Murus Gallicus can also be played online at the igGameCenter website: <http://www.iggamecenter.com>. Murus Gallicus is one of a handful of games there that can be played against an AI opponent!

Lastly, if you want to play on an actual game board, Murus Gallicus can be purchased at the NestorGames website: https://www.nestorgames.com/#murusgallicus_detail

Murus Gallicus can of course be played with equipment borrowed from other games. As I mention in my review of Fenix on pages 23-24, the Fenix set by HUCH! is perfect. Murus Gallicus is unusual because of its symmetrical "capture" mechanism and the fact that only stacks can move. Just a few very simple but non-standard mechanisms come together to make a game of elegance and depth that is somehow reminiscent of Epaminondas—and not only because of the traversal goal common to both games. The power structures in Epaminondas are immediately apparent in the lengths of the phalanxes of pieces; the power structures in Murus Gallicus are immediately apparent in the distribution of stacks. Murus Gallicus is the Roman newcomer to Robert Abbott's "Greek" Epaminondas. ~Ed.



Hive

A beautiful game

by Francesco Salerno

Despite its being a relatively young game at only 20 years old, Hive can already count on a wide base of regular players and an official World Championship held every year online on the platform Boardspace.net. Here I want to comment on one of my favourite games played during the World Cup 2019. This game has a strong symbolic meaning as it was the last of the final match between Jewdoka (Joe Schultz) and Quodlibet (Christian Galeas). The match ended 3.5-1.5 in favour of Quodlibet, crowning him Hive World Champion for the third time!

The match score before this game was 2.5-1-5 for Quodlibet, and since the match was played over a total of six games, the game I am commenting on here could have been decisive. Jewdoka must win if he wants still to have a chance to clinch the match. He plays this game as White, so potentially with a tiny advantage. Quodlibet had demonstrated how to handle Black very well over the course of the match, although Jewdoka had won the previous game as White. Needless to say, this last game was particularly tense and fun and demonstrated that we still have a lot to learn about Hive. Let us start now!

2019 Online World Championship Final Match Game 5 Jewdoka – Quodlibet (Jewdoka-Quodlibet 2019-10-03-0001)

You can rewatch and analyse the game yourself using the Entomologist tool or directly on BoardSpace.net (Jewdoka-Quodlibet 2019-10-03-0001). I have added as many diagrams as possible to make comments clear, but the notation system is a powerful tool to discuss the game clearly and concisely, and I assume it is known to the reader. The notation system is explained in *AG17* and in Randy Ingersoll's book *Play Hive like a Champion*.

1. wL, 2. bG1/wL, 3. wQ wL-, 4. bL/bG1, 5. wA1 wQ/, 6. bQ -b



Figure 1: Position after 6. bQ -b.

“Wait a second! Didn't you say in a previous issue of this magazine (*AG17*) that it is crucial to develop your fast pieces (Ants/Mosquitoes) as soon as possible to have high mobility (especially for Black)? What is Quodlibet doing here?” Keep

calm, he knows what is doing. At first glance, sure, the black Queen is in an unusual position as she self-pins two friendly pieces at once. One pinned bug is inevitable but what about the second? Other factors come into play: (1) the Ladybug is an effective defensive piece, and can be combined with a Mosquito played in at -bG1; (2) in general, this more stretched shape gives black more *spawn points* (available hexes for a player to place new pieces from the reserve) than does a compact *hub* (see Figure 2). The hub is considered a safer approach than the *elbow* shape (see Figure 3), but the latter retains more flexibility, as will be clear later. All in all, Black's strategy is slower but has its merits and is recently gaining followers.



Figure 2: The hub shape.



Figure 3: The elbow shape.

7. wA2 wA1-, 8. bM bQ/, 9. wS1 wL/, 10. bP -bM

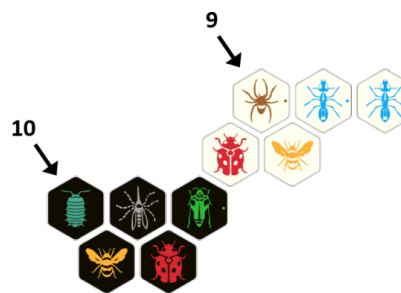


Figure 4: Position after 10. bP -bM.



Figure 5: Defensive shell with Mosquito safe in a pocket.

White has increased his mobility as expected (two Ants in play) and with his last move he threatened to pin the black Mosquito. As Black has to defend against it (pinning a strong piece such as the Mosquito using a weak one such as a Spider is disadvantageous for the Mosquito side), White places the Spider with tempo. On the other hand, Quodlibet answers by creating a typical defensive *shell* with the Pillbug placement. This achieves two goals at the same

time: (1) neutralizing the Spider threat as the Mosquito is now safe in a pocket (see Figure 5) and will be able to escape later moving as a Ladybug/Grasshopper; (2) optimally placing the Pillbug (in combination with the Mosquito), to defend the Queen—and the Pillbug would likely have been played next to the Queen anyway sooner or later. Now, White has firepower, with two Ants in play ready to pin any bug Black can place. On the other hand, Quodlibet has a *flexible shell* in place. This means he has several options to react effectively to White's attack. What next?

11. wS1 bP/, 12. bA1 bL-

Black felt this was the right time to sacrifice an Ant to keep at least one of the opponent's Ants busy. It will be clear soon that this placement has also a second purpose. An alternative "waiting" move was 12. bS1 bL-, threatening to attack the white Queen, but sooner or later Black will need to place some Ants anyway.

13. wA2 bA1\

Jewdoka delays the attack on the Queen in order to keep more control over Quodlibet's Ants. What should Black do now, sacrifice a second Ant, maybe, so that he can finally place a third free and happy Ant?

14. bL wL/

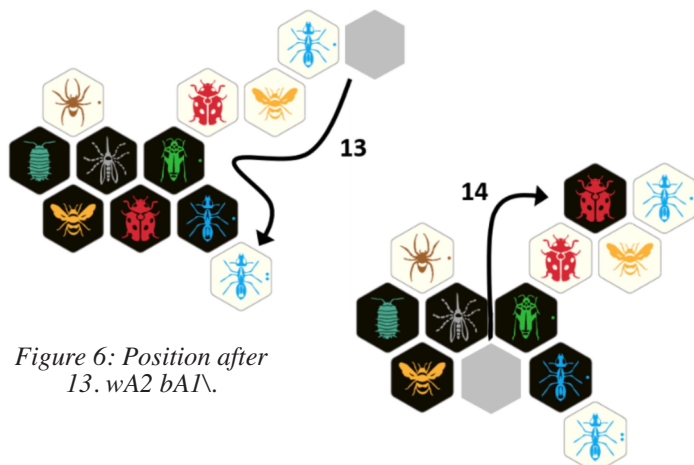


Figure 6: Position after 13. wA2 bA1\.

Figure 7: Position after 14. bL wL/.

Not this time! Now we see all the advantages of having such a flexible structure: Black has potentially two pockets (see Figures 8 and 9, below) and chooses to empty one of those to make room for another bug (potentially a safe place for a Beetle). At the same time, the Ladybug gets close to the white Queen and represents an *anchor* for Black, a friendly bug in enemy territory used to place new pieces in aggressive positions.

15. wA1 bQ\

This move not only starts an attack on the enemy Queen (an anchor for White as well), but most importantly prevents Black from making use of his pocket.

16. bA2 bL/



Figure 8: Pocket for the black Mosquito.

Figure 9: Pocket for the black Ladybug.

With 16. bA2 bL/, Black places the second Ant finally! I found this move to match quite well with a general principle: *react to an attack on your Queen by increasing your mobility*. White does not want to move his Ant#1 again now to pin black Ant#2 as he would lose a tempo and the initiative, and therefore Jewdoka plays a safe move—time for the Pillbug to appear.

17. wP wQ-, 18. bA3 -bA

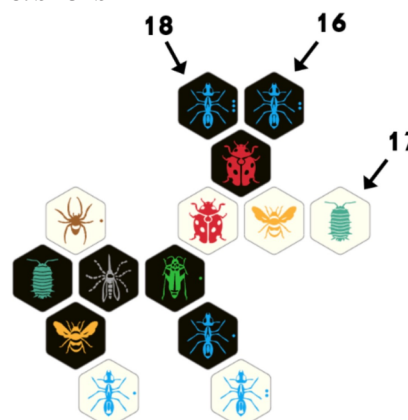


Figure 10: Position after 18. bA3 -bA.

With move 16, Black was threatening to *choke* the Queen with bA2 wQ-. *Choking* is used to indicate the complete control over an opponent's bug. In this case, Black would have prevented white from placing the Pillbug next to his Queen. Therefore, White was virtually forced to place the Pillbug before it was too late. Black takes advantage of a previous White defensive move to increase his firepower. In general, when your opponent is able to launch a Beetle attack (White can potentially place Beetles close to the black Queen now, with 19. wB1 /wA1 or 19. wB1 \wS1, for instance), it is a good idea always to have two Ants/Mosquitoes free in order to pin the opponent's attackers (the *two defenders rule*). Black seems safe now, and White has to find an attack.

19. wA3 wS1/

Now it is White who needs to sacrifice an Ant to obtain some play, even though it was also possible (and maybe more logical) to pin the newly placed Ant with the Spider (19. wS1 -bA3) to reduce Black mobility by a little. Probably Jewdoka did not want to leave to Black new *spawn points* close to the black Pillbug-Mosquito pair.

20. bA3 \wA3, 21. wB1 /wA1

It is important to realise that in Hive PLM (all three expansions included), the Pillbug is a game changer. When the Pillbug is placed next to the Queen, it can save the game almost every time by warping the Queen out into a safer spot using its ability, just before the *kill shot*. In most cases, part of your attack plan must involve neutralizing the Pillbug first, before immobilizing the enemy Queen under your Beetles/Mosquitoes. Therefore, you must find the right timing to place your Beetles in play. Here, it seems this *single beetle attack* can be easily stopped by a black Ant (22. bA2 /wB1), so why not wait for a more opportune moment? Jewdoka's plan was likely to continue by putting a Mosquito into play, and then try to *convert* it to a Beetle, taking advantage of the Beetle#1 just placing in the area of the black Queen. However...

22. bB1 -bQ

Black uses another method to defend, sparing his Ant for other jobs: he places a Beetle ready to *recover* the white Beetle once the white Beetle covers the black Queen. The Queen will still be immobile under two Beetles, but the Pillbug-Mosquito setup offers great defensive chances.

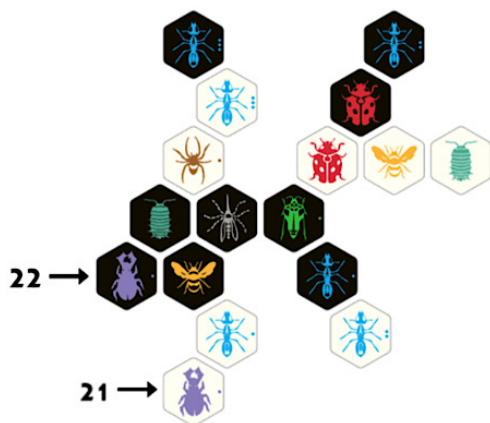


Figure 11: Position after 22. bB1 -bQ.

23. wB1 wA1, 24. bB2 -bA2, 25. wS2 wP\

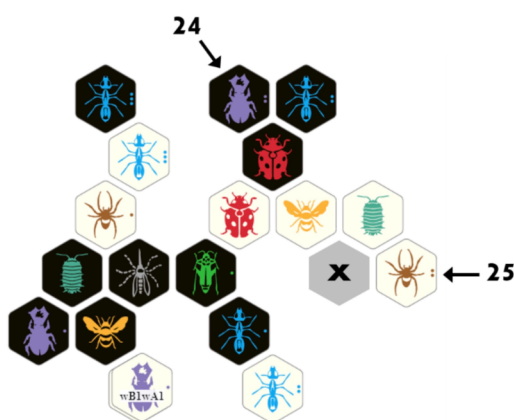


Figure 12: Position after 25. wS2 wP\.

Although White already has a menacing Beetle on top of the hive, he still needs to be careful. I think that 25. wA2 \bB2 was an interesting alternative here with the idea of preventing Black from using his last Beetle. With the white Pillbug already in play, it will be really hard to stop the white Queen from being warped easily to

a safer place when necessary. It is also true that after 25. wA2 \bB2, Black can still free his Beetle#2, but that comes at the cost of an Ant again with 26. bA1\bA2, and White still has the resources to defend.

The move played by Jewdoka is still sound and creates a safe space (the "X" in Figure 12) for a defender (Beetle or Mosquito), ready to cover the enemy Beetle moving towards the white Queen. At the same time, White still has one Beetle or Mosquito in reserve to attack, and the situation is unbalanced, with chances for both players.

26. bB2 bL, 27. wS2 bA1-

It turns out that Jewdoka had other plans for his Spider#2, that is to replace the pin on the black Ant#1 and free the white Ant#2. However, this leaves black Beetle#2 free to advance undisturbed... I feel 27. wB2 -wS2 was more natural (although clearly more defensive).

28. bA2 wA2\

Quodlibet immediately pins the free white Ant!

29. wB2 /wB1

Jewdoka keeps attacking with his second Beetle. Another option was to limit Black's mobility by playing 19. wS2 bA2\.

30. bB2 wL

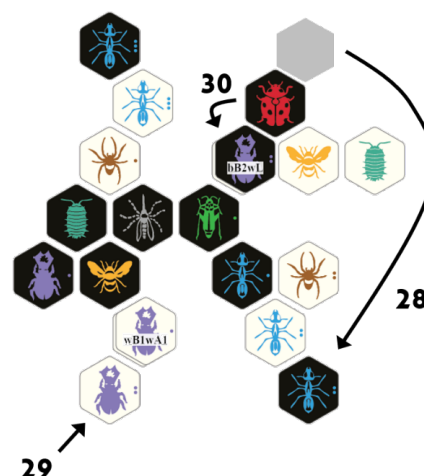


Figure 13: Position after 30. bB2 wL.

Another option was to pin the white Beetle#2 using one of the black Ants, but this would have set free one of the white Ants, which in turn could have pinned the black Beetle#1. Quodlibet improves his position sufficiently to proceed with the attack without needing to defend right now. Speaking of which, what is Black's attack plan? Why cover the white Ladybug and not the Queen? This will be clear soon.

31. wB1 bQ, 32. bB1 wB1, 33. wB2 -wA1

The position gives chances for both players: White has already covered the black Queen, he has four bugs in reserve, and the Pillbug is well placed to defend; Black has better Ant control, with a Beetle on top of the hive and the defensive Pillbug-Mosquito combo.

34. bG2 \bA3!

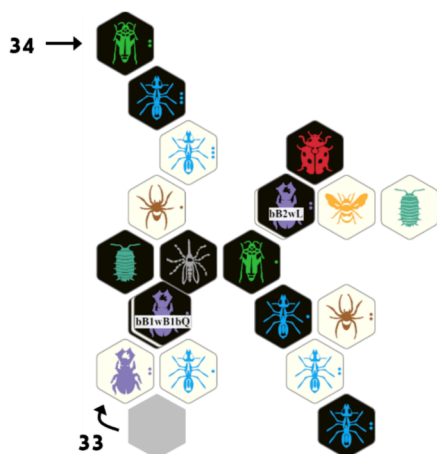


Figure 14: Position after 34. bG2 \bA3!

Black correctly calculates that rescuing his Mosquito is a crucial part of the plan, and 34. bG2 \bA3! is a critical move to ensure it.

35. wB2 bB1

Pinning the Grasshopper with 35. wA1 \bG2 should have been considered as well, slowing down White's own attack, but preventing the inner structure of the hive from becoming too favourable to Black.

36. bG2 wS1-, 37. wS1 \bA3, 38. bL bP/

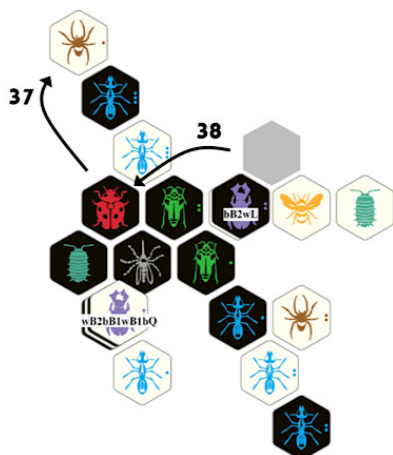


Figure 15: Position after 38. bL bP/

Now it is all clear! The black Mosquito can escape by moving either to \wQ or to /wQ, Black will have a second Beetle available and the spot left behind (wB2/) becomes almost inaccessible to White.

39. wB2 bP?

Covering the Pillbug is normally the most sensible thing to do as it is the biggest defensive strongpoint. However, looking at the important role of the black Mosquito in the next few moves, 39. wB2 bM (covering the black Mosquito) should have been considered seriously. Now the black Mosquito will transform into a powerful Beetle! The Black counterattack is very hard to stop.

40. bM bG1-, 41. wS2 bA2\, 42. bM wQ

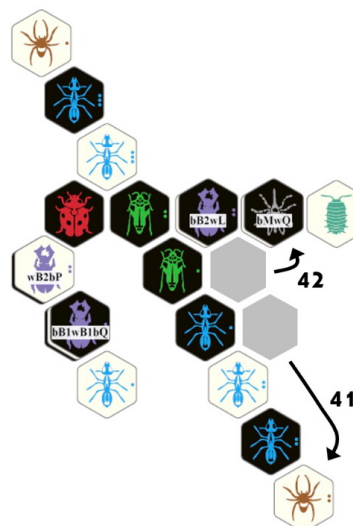


Figure 16: Position after 42. bM wQ.

Black has now two white *kill spots* (\bM and /bM) where he can *directly drop* a piece from the reserve, the most efficient way to attack. Jewdoka tries to control one of these hexes moving his Pillbug and Ant#1 but it is too late.

43. wP bM\, 44. bS1 bM/, 45. wA1 \bS1, 46. bG3 bB1-!

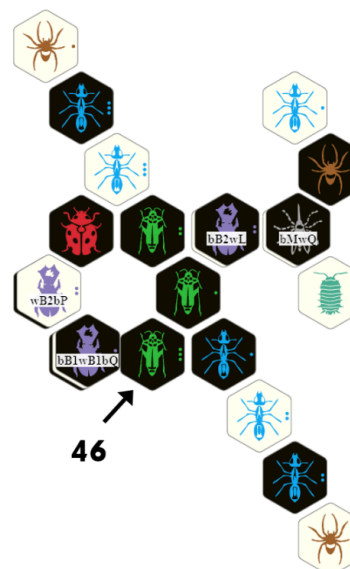


Figure 17: Position after 46. bG3 bB1-!

Elegant move! Rings are bad... except when you are the only one who can break them! The power of this ring resides in the ability of the black Grasshopper#1 to break it and form it again dropping a new piece in the same hex. The next moves are almost forced, two Beetles on top of the hive are simply too strong, and White does not have good defensive measures or enough pieces to counterattack.

47. wM wA1/, 48. bG1 bB2/, 49. wP bM-, 50. bS2 bA1/

Forming the ring again! This time it will be broken by the black Grasshopper#2, with deadly consequences.

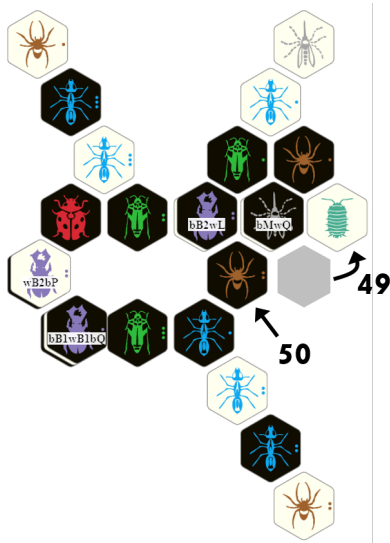


Figure 18: Position after 50. *bS2 bA1/-*.

51. *wP bS1-*, 52. *bM bS2-*, 53. *wM wA1-*, 54. *bG2 wQ-* Black wins.

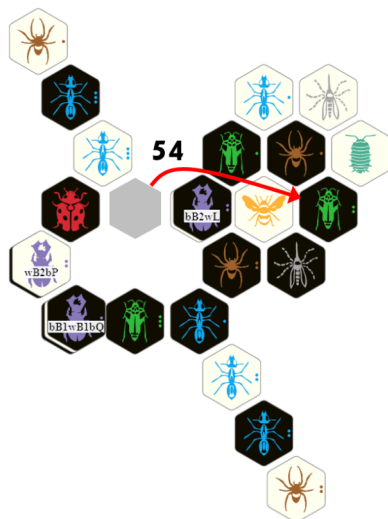


Figure 19: Final position, after 54. *bG2 wQ-*.

Black Grasshopper#2, introduced on move 34, concludes this exciting game, the match and the 2019 World Cup!

If you keep studying this particular game, you will find many ideas I have not discussed here, at so many different levels that literally anyone can learn something from it. I hope you have enjoyed reading through this annotated game as much as I did watching and analysing it! ■

References and resources

- A lot of the jargon used in the article was created by Jewdoka (Joe Schulz) in his book recently published: *The Canon of Hive: Groundwork*, a monumental work that lays the foundation for any player who wants to start studying Hive for competitive play!
- The BoardSpace.net Hive Viewer, an off-line tool to review the games played on BoardSpace.net:
<https://www.boardspace.net/hive/hive-viewer.shtml>
- The diagrams here were made with The Entomologist's Tool, for viewing games online:
<http://entomology.appspot.com/hive.html?game=5MHUgvOr4B2YzvRK0apRYA>



Meet the Dagaz!

by Valentin Chelnokov

The name of my project Dagaz was inspired by the name of the twenty-third Elder Futhark rune $\mathfrak{M}$, which can be translated as “revival.” This rune reminds me of a board game piece and its meaning corresponds to the idea of stimulating interest in abstract games through the creation of a universal game engine both for players and designers.

My passion for board games started with two events. First of all, I met Dmitry Skiryuk—Russian writer and a great enthusiast of games such as Go, Checkers, and the Mancala family of games (mainly the African branch of them). At about the same time I discovered the Zillions of Games game engine. Unfortunately, I got acquainted with this project quite late, when the main excitement around it had already begun to wane. But it did not stop me from making several dozen games and writing a large number of articles on this topic. The Zillions Rules File scripting language (called the “ZRF” meta-language for short) literally turned my mind upside down. I could not imagine how many completely different games could be created with it.

The further I progressed in the study of ZRF, the more I realized that only fairly simple games, preferably similar to Checkers or Chess, were easily implemented in it. When it came to something more complicated, such as Mancala, for example, I had to use bulky and obscure structures that worked slowly and unreliably. And so, I mastered the Axiom Development Kit, a plugin DLL extension for Zillions developed by Greg Schmidt. This allowed me to develop more complex games, such as Rithmomachia, (see also *AG15*) but it was still difficult and time consuming. Besides that, both Axiom and Zillions only worked with Windows, but I wanted to see a cross-platform solution that could be run anywhere, even on a smartphone.

Demand for such a solution determined the choice of technology. The only programming language natively supported by almost all modern Internet browsers is JavaScript. I did not want to handle Java applets, which are already considered outdated and inconvenient technology. The WebAssembly technology, in turn, was not suitable for me, for some other reasons. My goal was to make every user able to have full access to the open-source code of a program while it runs, so users could figure it out and develop their own games in the same way as they can in Zillions of Games, but more easily.

Of course, any approach has its drawbacks. The downside of JavaScript's openness is its relatively low performance, compared to computer languages such as C++ or Java. After a series of failed experiments, I realized that I would not be able to interpret the ZRF description directly while running the game. It worked too slowly. Then I created Z2J, which converts ZRF files into JavaScript code. The converted game description code looks too machine-generated and is difficult to edit manually, but it is as understandable as ZRF.

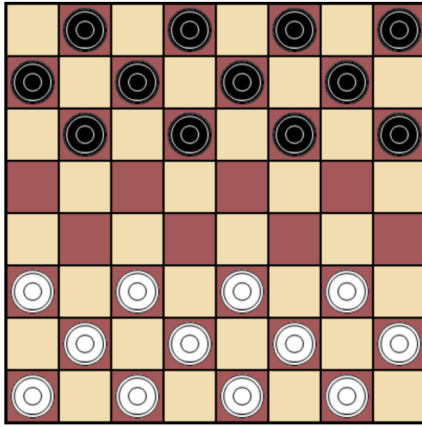


Figure 1: Russian Checkers.

I started with Russian Checkers, because I always considered the games of this family greatly undervalued. Without understanding its complex game mechanics all further development would be meaningless. Particularly, I am talking about composite moves. The fact that a move can consist of several consecutive moves is a very important matter. Another contribution of Checkers is the implementation of priority moves. If there is an opportunity to capture an enemy piece, it must be captured. Capturing is compulsory even if in future it weakens the player's position. Subsequently, the priority moves mechanism had to be entirely reconsidered and updated for many other games, but it firmly formed the foundation of the Dagaz project.

Chess pitched me the idea that some moves can consist of multiple pieces moving at once (e.g., castling). Moreover, not all possible piece moves can be allowed—the King for example may never move himself into check, where he could be captured. So I had to implement a verification mechanism for a checkmate. Checkmate verification (move prohibition) is more difficult than priority capturing in Checkers, since the prohibition can apply to any moves, both “capturing” and “non-capturing.” Checkers can also have different verification rules, being far from simple. In some types of games, it is necessary to capture the maximum possible number of enemy pieces, and other games, such as Frisian Checkers (see also *AG10*), go even further, giving priority to capture crowned (promoted) pieces first.

I could not afford to waste time describing such a complex problem in the logic of ZRF checks and then translate it into JavaScript, even if I knew how to do it. Anyway, the code obtained from Z2J in this way is not very optimal. It is much more reasonable to describe such verifications in JavaScript directly. I used ZRF just to describe the basic logic for moving pieces, but passed rules verification to JavaScript-extensions. Before entering the UI, the list of moves generated by the game's preset is passed to additional modules connected to the game. The extension module can effectively perform complex checks, prohibit individual moves, and enrich them by additional actions.

Atari Go perfectly illustrates what has been said above. Standard moves in this game are pretty simple—just place a stone on any vacant intersection (“point” of the board). But not all kinds of moves are allowed—a “suicide” move that makes a player lose the last liberty of his group of stones is forbidden. A player may not place a stone such that it or its group (called “chain”) immediately has no liberties (i.e., vacant points adjacent to a stone, along one of the grid lines of the board), and a chain of stones must have at least one liberty to remain on the board. At the same time, it is checked if a player's move surrounds the opposing stones so that they have no

liberties—then those opposing chains are captured and removed from the board (if happening in Atari Go, it means losing the game). All these checks and verifications are too difficult and numerous to be done in ZRF.

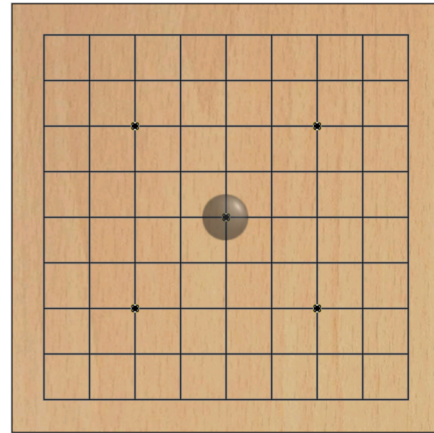


Figure 1: Atari Go.

When I was experimenting with Zillions of Games, I discovered another problem related to the game of Go. When removing a large number of stones at once (this situation is rare, but still possible), the application crashes, as a result of an overflow of the internal memory buffer. Zillions saves each move and all changes that occur after in text format (ZSG notation). Move description consists not only of the action of placing a stone by itself but also all other attributes attached to the stone and its neighbours: including player, position, piece removals, etc. But since captures in Go are completely determined by adding only one stone to the current position, it should be enough just to verify that a stone was placed. In Dagaz, captures with removals in games such as Go or Checkers are considered as side effects that directly follow from the rules of the game when making a move. The program core, in accordance with the rules, can always restore all of the changes and side effects and automatically adjust them to the main sole action, so there is no need to include this information in the text description of every move. As a result, the description of the moves made is very brief and uncluttered.

One other question that Dagaz helps to solve is software rendering and positioning of a piece on the board. In Zillions, for each piece there is a limited number of bit flags, describing each piece's attributes in terms of “Yes = 1” and “No = 0.” For example, it is used in Chess castling—the King and the Rook that you would castle with must not have been moved earlier in the game. Any move of any of these pieces changes the value of a bit flag from No to Yes—“Was there a turn with a move preventing pieces from castling? Yes, there was. And no castling is allowed anymore.” Dagaz avoids the limits on value-type present in ZRF. It can save not only Boolean values, but any other kind of attribute and its value-type. Playing Mancala needs to use an integer number value-type to show the quantity of pieces (“seeds”) in each defined hole (“house”).

Oware is the most famous of the African Mancala family of games. The game starts with four seeds in each house. Players take turns moving the seeds. On a turn, a player chooses one of the six houses under his control (except scoring houses at the sides—one for each player). The player takes all seeds from one house, and distributes them, dropping one in each house counterclockwise from the house he has chosen, in a process called “sowing.” Seeds are not distributed into the end scoring houses,

nor into the house drawn from. If the last seed is dropped in the opponent's house and its total quantity is 2 or 3 there, then all seeds are removed from this house and put in your scoring house. If the previous-to-last seed also brought an opponent's house to 2 or 3, these are captured as well, and so on. The object of the game is to capture more seeds than your opponent and to store them in your scoring house.

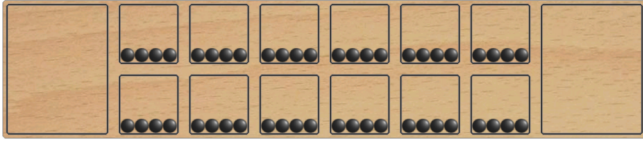


Figure 3: Oware

It is not surprising that Zillions of Games meets several obstacles to implement the mechanics of Mancala. First of all, the piece image in this game is just a picture. Zillions cannot draw it with the help of a programming language, so no software rendering is possible. As a result, in each house different numbers of seeds had to be encoded as a separate type of piece, 1 seed is 1 piece and 2 seeds is not 2 pieces but is another type of piece entirely. This mechanic increases the number of images needed to describe the corresponding number of pieces in an arithmetic progression. It is still complicated by the lack of ability to work with integers, and you need to use bit flags to emulate normal addition and subtraction. In the Axiom Development Kit, integer arithmetic was added, but Mancala continued to be a tough nut to crack. In Dagaz, I went further along the path of simplifying the structural description of such games. As a bonus, simpler solutions tend to work more efficiently.

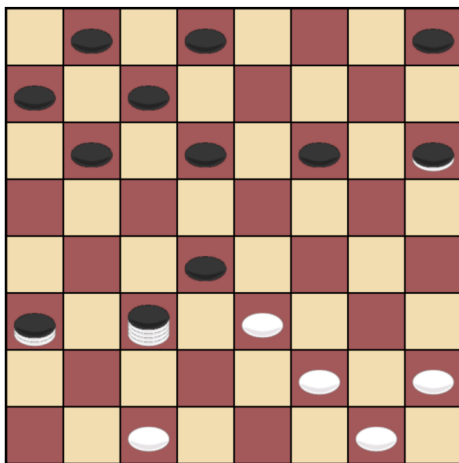


Figure 4: Column Checkers.

Russian Column Checkers, also known as Bashne (see AG1 and other issues) are very similar to Mancala games, but there is one exception. Unlike seeds put together in one house, the order of pieces in a column matters, not only their quantity. Integer numbers are not enough to describe the organization of a column with pieces placed in a specific order, so I added more types of values to the Dagaz attributes. To describe the order of pieces in a column, I use strings as attributes. Actually, Dagaz makes it possible to use arrays and even other data structures, but I prefer to use text, because it is easier to save in a file. Using software rendering to display each piece is a very powerful feature to control it. Here is an example of how this option can be used: in the game of Go there is a super-ko rule, which says that players are not

allowed to make a move that returns the game to a previous position. For its visualization, a square is used, which is not a piece, but is simply displayed on the board as an image to mark a field that is not available for the player's move. In Renju (AG5 and AG6), the list of forbidden moves differs, but I also used the same software-rendered square to display them.

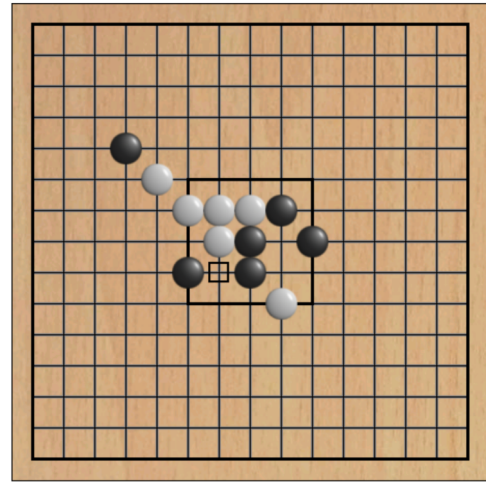


Figure 5: Renju

Rules prohibiting making a move that returns the game to the previous position can be fairly complicated. The aim of Morabaraba is to create a "mill" by placing a cow (piece) on an empty intersection on the board—a mill is a row of three cows on any line drawn on the board. If a player forms a mill, he may remove or "shoot" one of the opponent's cows. The shot cow is removed from the board and not placed again. A cow in a mill may not be shot unless all of the opponent's cows are in mills, in which case any cow may be shot. A mill which is broken to form a new mill cannot be formed again on the next move. Red crosses in Figure 6 mark the mill broken by the previous move. But, even when an intersection is crossed, the player still can place a cow there if this move will not rebuild the mill in this turn.

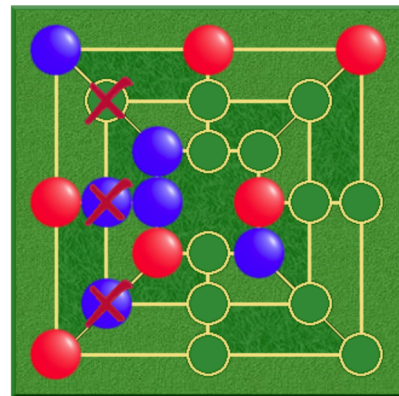


Figure 6: Morabaraba.

The same ability to display images on the board that are not related to pieces can be used for other purposes than prohibiting repeating positions. There are games where some of the information is hidden from the player. Usually, when we talk about games with hidden information, we mean card games, but the same principle applies to some chess-family games. In the game Dark Chess, the player does not see the spaces on the board that they cannot attack.

The same idea can be applied to other chess-type games.

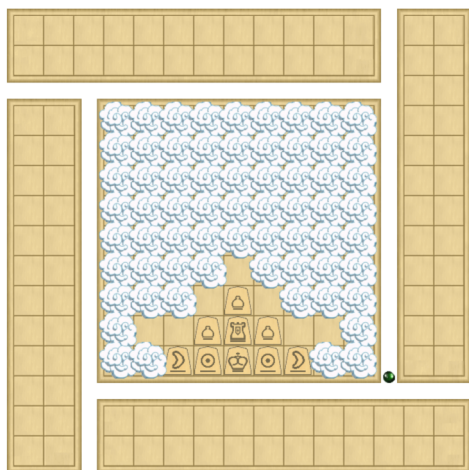


Figure 7: Dark Yonin Shogi

Dark Yonin Shogi, is a version of Yonin Shogi. Yonin Shogi is a famous Japanese game for four players. As with the other classical Shogi games which are played on small and middle size boards, Yonin Shogi saved the “drop rule,” whereby captured pieces are retained in hand and can be brought back into play under the capturing player’s control. On any turn, instead of moving a piece on the board, a player may select a piece in hand and place it on any empty square. Since there are four players, the game does not end after the first King is captured. All captured Kings as well as other pieces are sent to the hand reserve, and the player left without a King cannot move his pieces. Yonin Shogi can be played “in the dark” also—as in Dark Chess, Dark Yonin Shogi uses the concept “fog of war,” which hides the part of the board that is outside of the player’s attacks.

Developing these “dark” games’ mechanical peculiarity, Dagaz can use two special features for hiding both empty cells and even cells containing pieces—pieces can be made translucent, and if needed cells whether they are empty or not can be additionally hidden by an image covering them like an upper layer. The display of individual pieces is controlled by checking whether they are attacked or not. If the opponent’s piece is not attacked, it is not shown, and the same check is performed for the player’s own pieces—the player’s pieces that are not under attack are displayed as translucent. In principle, this verification would be enough to hide pieces in the game. However, it does not make it obvious whether a cell is empty or contains a translucent enemy piece. For this reason, a user asked me also to mark empty fields that are not under attack. This is how “clouds” appeared in the game (see Figure 7). The “cloud” is a software rendered image to show a cell is out of attack range. The player now keeps in mind that there is still a possibility that a cell can contain a translucent enemy piece, and he does not know if a cell is empty or not. However, it is obvious that an uncovered cell with no “cloud” and no visible piece inside it is just empty.

Such radical modifications are not always concerned with improving the appearance of a game. In some games, such as Gala (also known as Farmer’s Chess), pieces may change direction during their move. In Indonesia’s Surakarta (see *AG13*), the situation is even more interesting. In this game a “capturing” move consists of traversing along an outer circuit around at least one of the eight corner loops of the board, followed by landing on an enemy piece, capturing it. Displaying a “capturing” move in a straight line from the start to the end position, as in Zillions of

Games, will only confuse players—it could be confused with a “non capturing” move, although these are performed by a single step in any direction to an unoccupied point. In Dagaz, I have made animation of piece movements possible. When you make a move, whether it is straight, angled, or curved, its entire trajectory is visible, even when a piece passes over several board points in sequence. In some games, such as Surakarta, this feature is really important. In others, it is just a nice visual effect.

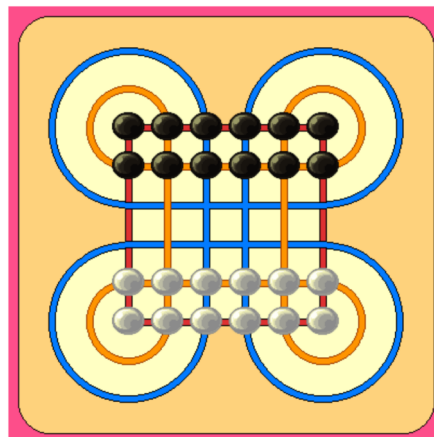


Figure 8: Surakarta.

Lastly, when the Royal Game of Ur was first discovered, no one knew how it was played, because its rules were lost to the ages. Several historical reconstructions have been suggested, but I like the rules best, which were developed by Dmitry Skiryuk. Of course, I could not pass up this game when I started Dagaz!



Figure 9: The Royal Game of Ur.

To sum up, I want to offer you another convenient tool for rapid implementation of board games. Dagaz continues the ideas laid down by the Zillions of Games project, but unlike Zillions Dagaz is a free product with fully open source code, available under the MIT license. My project at this time does not use a universal AI for any type of board game, but its several built-in bots can be customized for very different rules if needed. I have been working on this project for several years, so it was difficult for me to describe in this short article everything that has already been done. If you are interested in my work, please feel free to contact me. My email address is given on the Dagaz project’s GitHub page. ■

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- Zillions of Games: <https://zillions-of-games.com>
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<https://www.zillions-of-games.com/cgi-bin/zillgames/submissions.cgi?do=show;id=1452>



Schnapsen

The Classic Two-Player Trick-Taking Game

by Martin Tompa

Schnapsen is an exceptionally tight card game. It has similarities to other trick-taking games such as Bridge and Pinochle. I like to think of Schnapsen as “Bridge in miniature”: it is played with only 20 cards, it needs only two players, and one game takes only 15 minutes or so. Despite its miniature size, Schnapsen involves challenging strategy and every game is rife with thought-provoking situations.

Schnapsen is the national card game of Austria and Hungary, with variations played throughout Europe. The earliest known written reference to the game was over 300 years ago, but it was undoubtedly played long before that. It is truly a classic.

I will outline the rules of the game and then offer two find-the-winning-play puzzles that exemplify the thought-provoking situations that arise in every game. To really appreciate the strategy issues in this game, you should take some time to work out what you think is the best play before reading my solution to each puzzle.

If, after finishing the article, you want to face a terrifying opponent in a game of Schnapsen, I encourage you to play against Doktor Schnaps, the best Schnapsen-playing program on the internet. It was written by Artificial Intelligence expert Florian Wisser of Vienna, is freely available, and is devilishly hard to beat.

The Rules

Schnapsen is played with just five cards—Jack, Queen, King, Ten, Ace—from each of the four suits. This listing of the five cards specifies the order of the cards in each suit from lowest to highest: the Ten comes between the King and Ace in rank. Each card has a trick point value:

Card rank	Trick points
Ace	11
Ten	10
King	4
Queen	3
Jack	2

You may have played some games with tricks (such as Bridge or Hearts) and perhaps played games with trumps. For those who have not, I will start with an explanation of these concepts. One player is on *lead*, selects a card (called the *lead*) from his or her

hand, and plays it face-up on the table. The other player (the *follower*) then selects a card from hand and plays it face-up on the table. These two face-up cards comprise the *trick*. The winner of this trick is determined as follows. First, one of the suits has been designated (as explained later) to be the all-powerful “trump suit” and the cards in this suit are called “trumps.” If neither player played a trump to the trick, then whoever played the higher-rank card of the suit that was led wins the trick. If either player played a trump, then whoever played the higher-rank trump wins the trick. (As an example, suppose that spades are trump. If the player on lead plays ♠Q and the follower plays ♦A, then ♠Q wins the trick. The follower can win this trick only by playing a higher club or a trump.) The winner of the trick collects the two trick cards, places them face-down in front of him or her, and is on lead to the next trick.

A Schnapsen game consists of a sequence of deals. The goal of each deal is to collect enough cards in your tricks to total at least 66 trick points. As soon as that happens, you declare 66 and the deal is over.

The player who is dealer alternates from deal to deal. The dealer deals five cards to each player, deals one card face-up on the table (the suit of this card is the trump suit for this deal), and places the remaining nine cards face-down on the table. The ten cards on the table are called the “stock.” The face-up trump card is treated as though it were the bottom card of the stock, that is, it is the last card that will be drawn from the stock.

The non-dealer is on lead at the first trick. The player on lead can select any card in hand to lead. The follower may be constrained, depending on the state of the stock. Initially the stock is open. (The other possible states of the stock are closed and exhausted, discussed later.) When the stock is open, the follower's choice of card to play is completely unconstrained. For example, the follower is allowed to play a trump on a non-trump lead, even if the follower holds cards in the suit that was led.

Assuming the stock is open, the winner of the trick draws one card from the top of the stock and then the loser does likewise. This order matters when there is only one face-down card remaining in the stock, because then the loser of the trick draws the face-up trump. Because of this drawing mechanism, each player will have five cards in hand at the beginning of each trick, provided the stock is open.

Whenever you are on lead (including before trick 1), you have three options before leading, and you may do any combination of them:



- If the stock is open and the player on lead holds the Jack of trumps in hand, that Jack may be exchanged for the face-up trump on the table.
- If the stock is open, the player on lead may close the stock. This is indicated by placing the face-up trump card on top of the face-down stock pile. The significance of closing the stock will be discussed later.
- If a player holds the King and Queen of the same suit in hand, those two cards constitute a *marriage*. Whether or not the stock is open, the player on lead may show such a marriage to the opponent. The player on lead is required to lead one of those two marriage cards, returning the other one to his or her hand. Marriages so declared immediately add extra trick points to the player's total, 20 points for a non-trump marriage and 40 points for the trump marriage. If these extra points bring your total to 66 or more, you can declare 66 and end the deal before leading. You may only declare one marriage each time you are on lead, even if you happen to hold two marriages in your hand.

Only the player on lead has these options.

If the stock is not closed during the first five tricks, then the last cards in the stock will be drawn at the end of the fifth trick. From this point, the stock is no longer open, it is exhausted. When the stock is either closed or exhausted, the rules for the follower become much more restrictive: you must follow suit and win the trick, if possible. More precisely,

- If you have any card of the led suit that ranks higher than the one led, you must play such a card.
- If not, if you have any lower card of the led suit, you must play such a card.
- If not, if you have any trump, you must play a trump.
- If not, you may play any card.

If the stock is closed or exhausted, no more cards are drawn from the stock. Play continues with these restrictive rules until either some player declares 66 or both players run out of cards. If the stock is exhausted and both players run out of cards, whichever player took the last trick wins the deal. If the stock is closed and both players run out of cards, the closer loses the deal. Notice that the player that closes the stock can lose the deal in either of two ways: by failing to reach 66 trick points, or if the opponent declares 66 before the closer does.

When the deal is over, the winner of the deal scores some number of game points, and the first player to accumulate seven game points wins the entire game. If the stock was not closed, the winner of the deal is awarded game points as follows:

Loser's state	Game points
Loser took no tricks	3
Loser's tricks and marriages sum to less than 33 points	2
Loser's tricks and marriages sum to at least 33 points	1

Note that if the loser declared a marriage at trick 1 but never took a trick, the deal is still worth 3 game points, not 2.

If the stock was closed and the closer won the deal, then game points are scored as in the table above, except that the loser's state is measured not when the deal ended, but rather when the stock was closed. That is, if the loser had no tricks at the time when the stock was closed, the closer is awarded 3 game points, even if the loser accumulated some tricks after the stock was closed. Similarly, if the loser had fewer than 33 trick points at the time when the stock was closed, the closer is awarded 2 game points, even if the loser surpassed 33 trick points after the stock was closed.

Knowing when to close the stock is one of the aspects that makes Schnapsen challenging. You may want to close the stock in order to force your opponent to follow suit, or because you do not want to allow your opponent to draw any more cards from the stock, or because your opponent has not yet accumulated 33 trick points and you want to guarantee that you win 2 (or 3) game points. The risk of closing the stock is that you must reach 66 trick points (before your opponent does), and you will be penalized at least 2 game points if you fail. In particular, if the closer loses the deal, the closer's opponent wins 3 game points if he or she had no tricks at the time when the stock was closed, and otherwise the closer's opponent wins 2 game points.

Puzzle 1

I am calling these challenges "puzzles," but do not get the wrong idea. They are not cleverly contrived in order to be interesting. They are exact situations that came up in games I played. In fact, I chose this first puzzle because it represents one of the most important and frequent endgame situations you will encounter in Schnapsen. In any of these endgame situations, when you are at the table it is thrilling to plan and execute the winning play.

You are playing Schnapsen against Uncle Hans, an expert opponent, and find yourself in the following position:

Your cards	♠ - ♥Q ♣T, ♣K ♦A, ♦K
Concealed cards	♠ - ♥T ♣Q, ♣J ♦T, ♦Q, ♦J
Trump	♠Q
Stock	<i>Open, one face-down card</i>
Game points	<i>Hans 5, You 5</i>
Trick points	<i>Hans 27, You 28</i>
On lead	<i>You</i>

Before you can tackle this puzzle, we need to discuss how to read the card diagram. The table shows all the cards you have not yet seen (under the heading **Concealed cards**) and the cards that you are currently holding in your hand (**Your cards**). If the stock is exhausted, then the concealed cards are the cards that Hans is holding. But if the stock is either open or closed, then the concealed cards contain Hans's cards plus all the face-down cards in the stock. As a good Schnapsen player, you know the concealed

cards exactly, because you have been keeping track of what cards you have seen played.

The card shown under the heading **Trump** is the card that is currently face-up on the table. If the stock is exhausted, there will just be a suit symbol under this heading with no particular card of that suit shown. Under the heading **Stock** is the state of the stock and the number of face-down cards remaining in the stock.

In Schnapsen, **Game points** are counted down from 7 to 0. In the diagram above, the game point score is 5-5, meaning that each player needs 5 more game points to win the game.

Finally, there are headings for the number of **Trick points** each player has already accumulated (including any marriages declared) and an indication of which player is **On lead** for the next trick.

Do not get confused: the six cards listed as concealed are not Hans's cards, they are all the cards you cannot see. One of those cards is still face-down in the stock, and the other five are in Hans's hand, but of course you do not know which five.

One of your challenges in planning the play is to take into account the six possible hands Hans may be holding at this point.

Now go back to the card diagram above and plan your play for the remainder of this deal. When you think you have a good plan, you can read my solution.

Puzzle 2

A few deals later you find yourself in this position:

Your cards	♠J ♥T, ♥K ♣Q ♦J
Concealed cards	♠T, ♠K ♥J ♣A, ♣K ♦ -
Trump	♥
Stock	Exhausted
Game points	Hans 1, You 1
Trick points	Hans 36, You 32
On lead	You

You each need only one more game point to win the entire game, so this deal will determine the champion. This time the stock is exhausted, so you know exactly which five cards Hans is holding, thanks to your ability to track the cards played. How hard can it be to find the best play when nothing is concealed? Give it a try before reading my solution.

The header image shows equipment used in Schnapsen for keeping track of marriages declared and the game score. [Public domain image by Roland Screecher.] For any readers interested in a more detailed investigation of Schnapsen, the best source of information is Dr. Tompa's own book, Winning Schnapsen, reviewed in this issue. ~ Ed.

Puzzle 1 Solution

Despite having only 28 trick points, the first thing to consider at this juncture is whether to close the stock. A good reason to consider this is that Hans's trick point total is still under 33, so if you succeed you will gain 2 game points, even if Hans takes more tricks once the stock is closed. Another reason is that closing the stock will prevent Hans from drawing that last trump from the stock.

Suppose that you do close the stock. You do not want to be the first one to lead diamonds because, if Hans holds ♦T plus one or two other diamonds, you cannot prevent him from winning a trick with ♦T. It seems possible that you can compel Hans to lead a diamond, and perhaps that would mean you could capture the ♦T with your ♦A. You will have to eliminate whatever clubs he could lead safely, and then "throw him in" by leading ♥Q. (This scheme is called an "elimination play" and will be familiar to good Bridge players. As I mentioned, these elimination plays come up very frequently in Schnapsen.)

Let us suppose first that Hans holds the critical ♥T you need in order to throw him in. Begin by leading each of your clubs. If he follows suit to both club leads, you will be on lead from this position:

Your cards	♠ - ♥Q ♣ - ♦A, ♦K
Concealed cards	♠ - ♥T ♣ - ♦T, ♦Q, ♦J
Trick points	Hans 27, You 47

Since we are assuming for now that he has the ♥T, you will win from this position whichever two diamonds he holds. You throw him in by leading ♥Q, after which he is coerced to lead a diamond and you can win both diamond tricks. Even if his diamonds are only ♦Q, ♦J, you will end with $47+11+4+3+2 = 67$ trick points.

Still assuming that he holds the ♥T, he might not follow suit to both club leads because one of the clubs is still in the stock. If he makes the obvious ♦J discard on your second club lead, you will be on lead from this position:

Your cards	♠ - ♥Q ♣ - ♦A, ♦K
Hans's cards	♠ - ♥T ♣ - ♦T, ♦Q
Trick points	Hans 27, You 46 or 47

Now when you throw Hans in with a heart, you are guaranteed to capture his ♦T and make plenty of trick points.

If Hans has only one club, he might make the devious play of discarding ♥T on your second club, foiling the throw-in. This would leave you on lead from this position:

Your cards	♠ - ♥Q ♣ - ♦A, ♦K
Hans's cards	♠ - ♥ - ♣ - ♦T, ♦Q, ♦J
Trick points	<i>Hans 27, You 54 or 55</i>

It is true that you can no longer throw him in, but his ♥T will have given you so many trick points that you can win just by “cashing” (that is, leading and winning) ♦A.

Finally, we come to the situation in which Hans does not hold the critical ♥T at all, so that the elimination play fails. In that case, this is the full position when you close the stock:

Your cards	♠ - ♥Q ♣T, ♣K ♦A, ♦K
Hans's cards	♠ - ♥ - ♣Q, ♣J ♦T, ♦Q, ♦J
Trick points	<i>Hans 27, You 28</i>

You cash ♣T and ♣K, Hans following suit, bringing you to $28+10+4+3+2 = 47$ trick points. You next lead ♥Q, hoping to throw him in, but he discards ♦J, bringing your total to $47+3+2 = 52$. Now you are the one who has to lead diamonds, but that is fine because cashing ♦A brings your total to $52+11+3 = 66$.

There were many possible contingencies for you to work out, but in each one you are guaranteed to score 2 game points. You have done the hard part of working all this out in your head, so go ahead and close the stock, sit back, and enjoy the pleasure of watching your plan unfold.

Solution to Puzzle 2

You cannot possibly win a spade or club trick. The most you can hope to win are two trump tricks and the diamond, which would make your trick point total $32+10+4+2+2+4+4 = 58$. This means that your only chance of winning the deal is to win the last trick. (Recall that, if the stock is exhausted and no one claims 66, the winner of the last trick wins the deal.)

Your cards	♠ - ♥K ♣Q ♦J
Hans's cards	♠ - ♥J ♣A, ♣K ♦ -
Trick points	<i>Hans 48, You 46</i>

You cannot afford to let Hans trump your ♦J, because that trick plus his two other winners would give him $36+2+2+10+2+11+3 = 66$ trick points. Leading ♠J won't work: Hans will win ♠T and then lead ♠K, forcing you to trump. This leaves you on lead from the position above.

Your only chance to win the last trick from here is to lead ♣Q, but Hans will win with ♣A and then lead ♣K, forcing you to trump again and leaving him with the last remaining trump.

Look back at the original position. The reason that leading ♠J ultimately let Hans win the last trick is that Hans has more cards in the spade suit than you do. The way to win the last trick is to leave such suits for him to lead first. (You will see this in action momentarily.) For the same reason, leading ♣Q will not work. The only possibility remaining for you is a trump lead. If you cash ♥T, you will be on lead in this position:

Your cards	♠J ♥K ♣Q ♦J
Hans's cards	♠T, ♠K ♥ - ♣A, ♣K ♦ -
Trick points	<i>Hans 36, You 44</i>

Now, not a trick earlier or later, is the time to lead ♦J. Hans can no longer trump it, so you do not have to worry about him reaching 66. What will happen when you lead ♦J? Hans is “squeezed,” forced to shorten one of those two longer suits to the same length as yours. You then lead whichever suit he discarded, because he no longer has more cards in that suit than you do.

Let us suppose Hans discards ♣K on your ♦J. (Discarding his ♠K instead would be entirely dual.) You continue by leading ♣Q, the suit he discarded. After winning that trick, Hans is left on lead in this position:

Your cards	♠J ♥K ♣ - ♦ -
Hans's cards	♠T, ♠K ♥ - ♣ - ♦ -
Trick points	<i>Hans 50, You 50</i>

Hans is forced to lead from the spade suit himself. Your last trump will win the last trick, the deal, and the game.

I call this play a “tempo squeeze.” Your lead of the diamond squeezes Hans into shortening one of his long suits and then, when you continue with the suit he discarded, he “loses a tempo,” as bridge players say. He has to lead from the long suit himself rather than being able to use a high card in that suit as an entry into his hand. This endplay nicely illustrates the fact that the struggle for the last trick often involves very different strategy from the struggle to reach 66 trick points. ■

References

- Doktor Schnaps: <http://schnapsen.realtytype.at>
- *Winning Schnapsen* is reviewed on pages 3-4.

by Kerry Handscomb

Rules

Figure 1 shows my design, and Figure 2 is the same design with some colour coding, which may make it easier to locate specific spaces quickly. The back cover is a Spiral board. The header shows the author's own beautiful and intricate design.

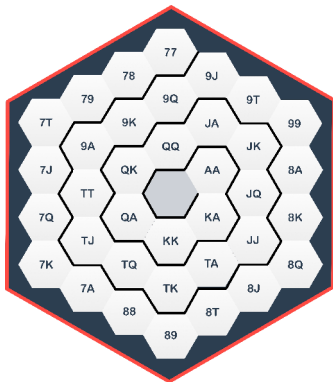


Figure 1: Simple board design.

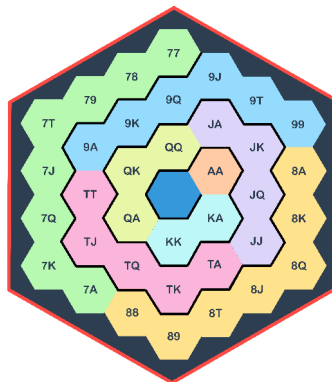


Figure 2: Simple board design with colour-coding.

The board starts empty. You shuffle the deck and deal the cards face up in four columns of eight cards each, as shown in the sample position in Figure 6, below.

You and Dr. Brooks alternate turns. You move first. For your first and subsequent turns, you select a pair of cards, one from the bottom of one of the four columns, and one from the bottom of another of the four columns. Place a piece on the board in the space indicated by the pair of cards you have chosen. If that space is occupied, place a piece in the next vacant space, moving down the spiral towards the outside of the board; if all spaces in that direction are occupied, then place a piece in the next vacant space moving up the spiral towards the centre of the board. After the move, place the pair of cards in a discard pile.

Dr. Brooks places two pieces each turn, one according to the pair of cards at the bottom of the first two columns, one according to the pair of cards at the bottom of the last two columns. The rules regarding placement of pieces on occupied spaces are the same: go down the spiral towards the outside, and if all spaces towards the outside are occupied, move up the spiral towards the centre. Pairs of cards are placed in the discard pile as they are used.

If after your turn or Dr. Brooks' turn one or more of the columns of cards has been emptied, then shuffle any remaining cards in the layout together with all the discards, and deal the cards out again to form four columns of eight cards each. In a typical game, you will have to deal the cards three times, with three different layouts, and the game should finish fairly quickly into the third layout. If one of the first two columns is emptied with Dr. Brooks' move, then complete her turn with the last two columns before redealing the cards.

You win immediately if your pieces on the board form a *fork*, joining three non-adjacent sides of the board, as shown in Figure 3. You lose immediately if your pieces on the board form a *bridge*, joining two opposite sides of the board, as shown in Figure 4. If your move creates a fork and a bridge simultaneously, you win. Dr. Brooks wins immediately if her pieces form either a fork or a bridge. In addition to the two moves on a turn, Dr. Brooks has easier winning conditions! Note that corner pieces belong to both sides that they connect, as with Hex.

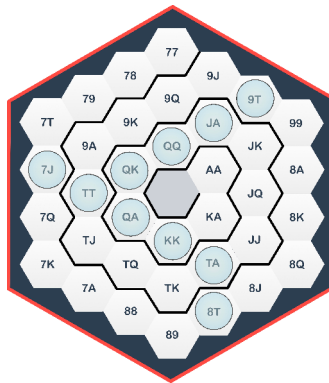


Figure 3: A fork—a win for you, a win for Dr. Brooks.

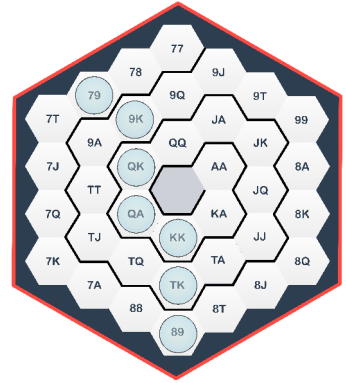


Figure 4: A bridge—a loss for you, a win for Dr. Brooks.

And that is all there is to the rules. It makes for a fairly challenging solitaire, in which I can win maybe one in three attempts. I suspect that with good play, you ought to be able to beat Dr. Brooks more often than not, although I have yet to reach that level of skill.

Spiral on BoardGameGeek:
<https://boardgamegeek.com/boardgame/201486/spiral>

Some observations

The centre space cannot be reached directly with any pair of cards. A little thought will demonstrate that the centre space only becomes occupied after all other spaces are full.

Each pair of turns results in three pieces being placed on the board, one of yours and two of Dr. Brooks'. Therefore, if 36 spaces are occupied, except for the centre, then it must be your turn to place the 37th., in the centre, which will decide the game. It is quite possible for the game to last this long, as shown in Figure 5.

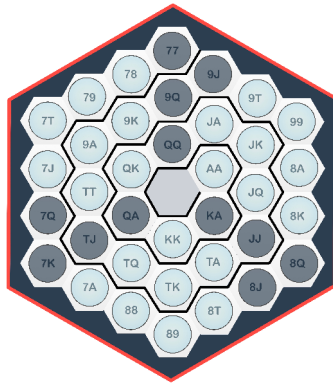


Figure 5: Example of a game undecided until the centre is occupied.

Inability to occupy the centre space any earlier means that winning positions before the board is full must detour around the centre. It seems to be a good idea to aim to occupy several several central spaces early in game, before Dr. Brooks can close down your options to go around the centre. On the other hand, if Dr. Brooks is moving to occupy all four spaces along an edge, it is good to get one of your pieces on that edge to keep your options open. Corner spaces are at a premium, as each one gives you a foothold on two sides.

Theoretically, it is possible to look at the initial layout of cards and fully plan your moves for the early part of the game. However, I find it difficult to look that deeply into the game, and often I move according to which pair of cards seems to give me the better move, without much analysis of the full layout. However, the first deal of the cards typically accounts for less than half of the game. Towards the end of the second deal, I might start looking at what is coming up next from Dr. Brooks, in case she has a strong move. Definitely at the start of the third deal, I will be doing more analysis, trying to plan for a win. The sample position below demonstrates the type of thinking required at this stage of the game.

Sample position

Figure 6 shows the beginning of the third deal, and Figure 7 shows the current position on the board.

Thirty pieces have been placed on the board, a multiple of three, and it is your move. We can see that the key space now is the **TK**, and whoever manages to occupy this space will win. The **TK** space can be reached through three possible pairs of cards, **JJ**, **TA**, and of course **TK** itself. Looking at the card layout, the clearest access to one of these pairs is the **♠A** together with either **♥T** or **♣T**. So, if you play **♣Q** together with either **♠9** or **♠8**, Dr. Brooks will necessarily uncover a **TA** combination for you with her move. This is the fastest and surest way to win, but are there any other winning moves?



Figure 6: Beginning of third deal in sample position.

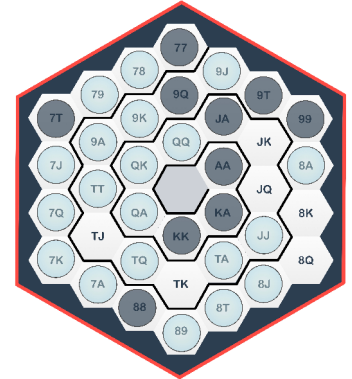


Figure 7: Board state in sample position.

Let us look at the game now as a war of attrition, where the players take turns to fill in non-crucial spaces. The longest sequence of moves will be **You - Dr. Brooks - You - Dr. Brooks**. If the game lasts that long, with neither player occupying the crucial **TK**, then at last, Dr. Brooks must get it. You do not have a winning move immediately, and therefore, your winning move must occur in your next move, before Dr. Brooks gets the **TK**. You cannot win a war of attrition!

So, for the analysis, imagine what Dr. Brooks' move is after each of your possible immediate moves. You must have a winning move after Dr. Brooks' next move, for otherwise you will lose. A little further scrutiny shows that only **♠9♣Q** or **♠8♣Q** gives the required winning move.

Conclusion

This example above demonstrates the kind of thinking needed to play Spiral successfully. Spiral is an interesting game, requiring some strategic thinking early on and accurate tactical analysis towards the end of a game. Spiral is very unusual in that it is a solitaire connection game. It should be easy for most gamers to put together a set. I highly recommend Spiral—and after the solitaire you can try the excellent two-player trick-taking game!

Variants

To make the game slightly easier, you may choose the bottom two cards of one column. If you prefer solitaire games with no random elements other than the initial deal (like FreeCell), then instead of discarding cards, move used cards to the top of their respective columns. To save table space, place used cards face down in a stack above the column. Once the column is empty, flip the stack face up and spread it downwards into a column. With this variant, you essentially “reset” a column of cards to its initial state once you’ve played all the cards in it.

Designer notes

The author, Raymond Gallardo, a technical writer from Montreal, makes the following comments about the development of Spiral:

(Continued opposite.)

“I’m afraid that some times you’ll play lonely games too, Games you can’t win ‘cause you’ll play against you.”

Dr. Suess, *Oh, the Places You’ll Go!*

“One of the main design goals for Spiral was to combine two of my favourite gaming genres: trick-taking and abstract connection games. Initial prototypes involved labelling every space of a connection game’s board (for example, the rhombic board of Hex) with a playing card. When you win a trick, you place a stone in every space corresponding to the cards you won in the trick. This was not fun, as players would spend too much time locating which card corresponded to which space on the board, slowing down the game too much. To reduce the amount of this cross referencing, I labelled each space with the cards that a trick could contain, minus the suits. But that limited me to a two-player trick taking game—there would be too many possibilities with three or more cards. As for which connection game to use, I opted for Cameron Brown’s Cross and its hex-hex board mostly for aesthetic reasons;

a hex-hex board fits on a letter-sized sheet of paper better than a triangular or rhombic one!

“The solo rules of Spiral were an afterthought. I realized that players could claim spaces by simply drafting them from a bunch of face-up cards. I thought of Sid Sackson’s game Suit Yourself, where players would draft cards from the bottom of face-up columns of cards. Then I thought of Cross’s predecessor, Jorge Gomez Arrausi’s Unlur, which has different, unbalanced objectives for each player: one has to connect two opposite sides, the other has to connect three non-adjacent sides. What is really cool about unbalanced objectives is that I could play with this imbalance by tinkering with other elements of the game, such as picking who gets what objective and the number of pieces a player may place during a turn.” ■



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Spiral

by Raymond Gallardo

